

The Insight for Initiation and Maintenance of Areca nut chewing Habit and its Effects on Oral Health Status among School Age Population in Western Rajasthan, India

ABHISHEK SINGHVI¹, ASHISH JOSHI², NEETA BAGUL³, SANYA BHATIA⁴, GURDEEP SINGH⁵, RAJKUMARI GUPTA⁶

ABSTRACT

Introduction: Areca nut is highly carcinogenic according to International Agency for Research on Cancer (IARC). Its usage is continuously increasing in children and adolescents in India.

Aim: The aim of the study was to understand the reasons for the development of the areca nut chewing habit at early age.

Materials and Methods: A total of 2846 subjects were surveyed from rural government schools between ages of 4 to 18 years in Western Rajasthan, India. A structured questionnaire was designed to record the factors associated with initiation and continuation of areca nut chewing habits. A systemic oral examination was done to assess current oral health status in

these users. Students were divided into two groups viz. Group 1 and 2, comprising of students from 4 to 10 years and 11 to 18 years respectively.

Results: Total 34.5% children in Group 1 and 72.8% in Group 2, were indulged with the habit of chewing areca nut. Study revealed that social environment and secondarily stimulating effect of areca nut have association with initiation and maintenance of habits. A total of 55 subjects were diagnosed at various clinical stages of Oral Submucous Fibrosis (OSMF).

Conclusion: Areca nut cessation programs should be initiated on the primary education level for the prevention of this habit in Western Rajasthan, India.

Keywords: Areca catechu, Prevalence, Submucous fibrosis, School age

INTRODUCTION

Areca nut chewing has deleterious oral health effects which is classified as Group I carcinogen by International Agency for Research on Cancer (IARC) other than betel quid with and without tobacco [1]. Areca nut contains three active ingredients; Alkaloids, nitrosamines and tannins. Alkaloids and nitrosamines exert genotoxic effect on oral mucosal fibroblasts which leads to Oral Submucous Fibrosis (OSMF) [2]. In Indian mythology areca nut is considered as a divine fruit and its usage has important place in social and cultural customs. Areca nut has addictive potential and an individual who starts this habit in early age becomes addicted in their adulthood. The tobacco companies take advantages of these customs in addition to properties of this product and conduct aggressive marketing. As a consequence, these are gaining popularity especially in the young ones [3]. Gupta et al., in 2002 recorded 32.1% prevalence rate of this habit in India [4].

Continuously increasing habits of areca nut chewing in young generation along with their oral manifestations in rural western Rajasthan, India, encouraged us to conduct a survey in rural government school-children. The aim of the study was to understand the behavioural and psychosocial factors that initiate and maintain areca nut chewing in school children. A systemic oral examination was carried out in self-declared users in these schools to observe adverse effects of this habit on oral mucous membrane.

MATERIALS AND METHODS

Sample: Survey was conducted in 20 government primary and higher secondary schools with a total of 2846 students, among whom male and female were 1528 and 1318 respectively. The list of schools was prepared according to the information supplied

by directorate of education, Jodhpur, Rajasthan, India. Schools were selected randomly in terms of gender, geographic area, level of urbanization, and Socioeconomic Status (SES). Around 50 schools were contacted for the study and each school's principal was informed about its purpose. Out of which 20 schools agreed to participate for the survey. Students were selected by stratified random sampling method based on age, gender, education and SES of parents. All the children enrolled along with their parents were given introduction regarding the survey so that they can understand the questionnaire and importance of the survey. Parents were personally interviewed by the team of surveyors to collect the data of SES. Parental consent and legal guardian consent was taken. A preliminary training was done prior to the main survey to provide practical experience in the methodology of study for the dental examiner. A pilot study was performed in all the enrolled schools and based on that final survey was planned. Visit to the school was made on pre-decided dates and all the students present on that day were examined. Children with the consent to participate in the survey were examined within their school.

Questionnaire: The questionnaire was structured on the basis of similar previous studies and modified after the conduction of the pilot study [5]. Questions included were subject's demographic characteristics such as age, gender and education. The education of mother and father was divaricated into primary class, secondary class and senior secondary or completed high school. We then calculated a continuous financial score by asking how much money is spent per day on "Supari" (Areca nut). Onset of areca nut chewing habits and frequency of chewing were the other important variables that were noticed. Onset of habit was based on age at which it was started and was divided accordingly.

Frequency of chewing and reasons for betel nut chewing were assessed like craving, tolerance, and a physiological withdrawal state when substance use is reduced or ceased. The expert of nut was entrenched as: own purchase, from parents, friends or other. Thereby, initiation of habit was divided into three categories namely by friends, by relatives or parents, or by advertisement and regarding awareness among school teachers, a straight forward question regarding detrimental health effects associated with nut use was also collected. However, the understanding of study by Group I students was questionable.

Ethical Aspects: The study was performed after approval from the Vyas Dental College and Hospital Review Board and each patient was recruited only after obtaining written informed consent.

Clinical Examination: In Group I subjects the questionnaire was filled by the examiner collecting the information from parents or guardians. When we didn't get appropriate information and response from guardians these subjects were excluded from the study. Clinical examination was conducted on a school chair and lighting was provided by a halogen diving light. A sterile mouth mirror was used for tissue retraction. WHO criteria was used for the detection of oral mucosal lesions [6]. The location and detailed description of oral lesions were noted. Parents or guardians were informed about the subject's oral health. Inter-incisal distance was measured in millimeters using a sterile metal scale to record any limitation of mouth opening and graded according to Haider et al., system [7].

STATISTICAL ANALYSIS

Statistical analysis was conducted using statistical software (Statistical Package for the Social Sciences Version 13.0; SPSS Inc, Chicago, Illinois, USA). Response value percentages were calculated for each question and for the lesion identified on the clinical examination. Discrete variables were analyzed using the Chi-square test. Pearson's Correlation coefficient was used to measure linear correlation between two variables where 1 is total positive correlation, 0 is no correlation and -1 is total negative correlation. The p-value less than 0.05 were considered as a significant difference.

RESULTS

Data was collected from 2846 subjects among which 1528 were boys and 1318 were girls studying in rural schools in Western Rajasthan. Group I comprised of 1174 subjects with 625 boys and 549 girls; whereas, Group II had 1672 with 903 boys and 769 girls. The mean age of Group I and Group II children was 7.382 and 13.980 years respectively whereas mean age of total number of students who participated in the survey was 11.258 years. A total of 406 (34.5%) respondents from Group I and 1218 (72.8%) from Group II were addicted to areca nut and its products [Table/ Fig-1]. The mean age of male and female chewers was 12.584 and 12.5 years respectively. Odds ratio for gender shows habit is 1.217 times more in males than females. A significantly higher frequency of areca nut chewing was observed in Group II subjects when compared to Group I subjects in both genders.

Parents (825 fathers and 799 mothers) of participants with areca nut chewing habit were evaluated for literacy level. An inverse relation was recorded between areca nut chewers and their parent's education. Most of the parents of addicted subjects were uneducated or had not completed their primary education [Table/ Fig-2].

In the present study we noticed that out of the various factors in initiation of habit, friends had significant influence followed by relatives. In few subjects advertisements of these products developed the craving to initiate the habits [Table/ Fig-3]. Psycho-social aspects play an important role for maintenance of the habits. Most of the subjects consumed areca nut products for pleasure. A

Age (in years)	Male		Female	
	Number of Subjects	Areca nut Chewers N (%)	Number of Subjects	Areca nut Chewers N (%)
Group 1				
4-5	78	12 (15.4)	72	8 (11.1)
5-6	75	19 (25.3)	69	15 (21.8)
6-7	69	28 (40.6)	63	24 (38.1)
7-8	142	47 (33.1)	109	38 (34.9)
8-9	140	49 (35)	123	49 (39.8)
9-10	121	65 (53.7)	113	52 (46.0)
Group 2				
10-11	108	76 (70.4)	96	63 (65.6)
11-12	103	71 (68.9)	94	61 (64.9)
12-13	119	84 (70.6)	102	68 (66.7)
13-14	114	84 (73.7)	100	69 (69)
14-15	121	92 (76)	104	76 (73.1)
15-16	119	94 (79)	96	71 (73.9)
16-17	118	94 (79.7)	92	72 (78.3)
17-18	101	79 (78.2)	85	64 (75.3)

[Table/ Fig-1]: Frequency of areca nut chewing in different groups.

Education of Parents	Father N=825 %	Mother N=799 %	Chi- square test statistics
Primary or no education	562 68.2	632 79.09	24.08 p-value<0.05
Secondary or higher education	263 31.7	167 20.9	

[Table/ Fig-2]: Parental education in areca nut chewers.

Social/Cultural Construct	Observed Frequencies % N=1624	Chi- square test statistics
Friends	1135 69.8	31.05 p-value<0.05
Relatives	337 20.7	
Advertisement	152 9.3	

[Table/ Fig-3]: Social and cultural factors in initiation of habits.

Psycho Social Effects (Areca nut Chewing)	Observed Frequencies		Chi- square test statistics
	Male 894 %	Female 730 %	
Pleasure	616 68.9	495 67.8	13.520 p-value<0.05
Interest in work	81 9.06	57 7.8	
Social interactions	197 22.03	178 24.3	

[Table/ Fig-4]: Psycho social aspects of areca nut chewing.

Quantity (grams/day)	Observed Frequencies		Chi- square test statistics
	Male 894 %	Female 730 %	
1-3	147 16.4	130 17.8	19,810 p-value<0.05
4-10	572 63.98	470 64.3	
11-15	63 7.04	66 9.04	
≥15	112 12.5	64 8.7	

[Table/ Fig-5]: Quantity of areca nut intake by subjects.

Clinical Stages	Male Total = 39	Female Total = 16	Total N=55 %	Chi- square test statistics
Stage I	2	3	5 9.09	19.810 p-value<0.05
Stage II	31	11	42 76.3	
Stage III	6	2	8 14.54	

[Table/Fig-6]: Clinical staging of OSMF.

total of 22.03% males and 24.3% females believed that this habit is essential for social interaction, whereas less than 10% subjects felt the development of interest in the work [Table/Fig-4].

More than two third of the subjects were consuming 4 to 10grams of the areca nut products daily. Only 12.5% males and 8.7% females were consuming more than 15grams of areca nut every day [Table/Fig-5]. Clinical examination of addicted subjects revealed 55 cases of OSMF, comprising of 39 males and 16 females. A total of 42 cases belonged to Stage II OSMF followed by Stage III (8 cases) and Stage I (5 cases) [Table/Fig-6].

DISCUSSION

Areca nut is a psychoactive substance which is available at low prices as compared to other similar substances like alcohol, tobacco and caffeine [8]. In the Indian states like Rajasthan, Gujarat, and Maharashtra these habits are rapidly increasing with severe oral health complications. Easy availability of these products near school premises has made younger ones addicted [9].

In present study we identified that areca nut chewing habit is more common in boys as compared to girls. A similar study considered that conservative culture of the society acts as a major inhibitor in adaptation of these habits in female. Girl's consciousness regarding their health and aesthetics make them uncomfortable in purchasing tobacco products from shops. Frequency of areca nut consumption and duration are the major risk factor for oral cancer. Duration being more significant than frequency underlines the fact that younger the age of onset, more are the chances of potentially malignant lesions [10]. The lowest age for habit initiation in our study is 4 years which is comparable to cases reported in previous studies [11,12]. A progressive higher frequency of habit is found in early adolescent as compared to primary school children. One reason could be lack of parental consciousness, increase in the allowance for routine expenditure and influence of friends. Friends are the major initiators as they spell bound the children by drawing their attention on psychosocial aspects of areca nut chewing like pleasure, tension reliever, euphoria and development of interest in work after areca nut chewing [13]. The reason for increased incidence is low cost, easy availability and attractive packaging of areca nut products that has made number of people getting addicted to it. Some advertisements show areca nut chewing as a status symbol and is considered sacred in certain cultures so its consumption is unobjectionable [13]. The frequency of areca nut use is more among children of lower socioeconomic areas, and reason for that is peer pressure and lack of awareness which would increase the incidence in groups who are already deprived of quality health care.

Present study states that lower level of parental education has been associated with higher risk of initiation of this habit. Illiteracy of parents is related with the lack of awareness regarding the hazardous effects of these products on oral health and fails to prevent their children from engaging into the one [14,15]. Younger individuals get easily fascinated by their surrounding society which had a major impact on commencement of this habit in our study. The consumption of areca nut is socially and religiously acceptable in Asian community [16]. Father being the patriarch in our society inspires children by his addictive practice, especially

one of chewing areca nut and unknowingly acts as one of the major offender for engaging child in this habit. This was almost similar to studies done by previous authors [17,18].

Areca nut is highly cytotoxic and genotoxic. Its continuous use can lead to OSMF [19]. Results of present study through light on this devastating disease as 3.38% of the students who were involved in areca nut chewing habit, developed OSMF. Most of the subjects having OSMF were in the habit of keeping areca nut product in the buccal vestibule and swallowing the contents after chewing. These findings further demonstrate that due to this style of chewing, fibrosis was more in buccal mucosa followed by soft palate and uvula [20].

In this survey, clinical examination revealed dominantly Stage II OSMF cases. As burning sensation and reduction in mouth opening started appearing and patients became alert. These students actively participated in the study so that they can get information of their current oral health status. Similar findings were observed by Tupkari in his study on 101 cases and he reported maximum cases belonging to Stage II and III [21]. These findings are cause of worry as it was an index of the youth developing this dreadful habit inadvertently with probability of developing oral lesions that have potential for malignant transformation [22]. Our subjects were unaware about the relationship between areca nut and OSMF. The clinically identified cases were referred to Vyas Dental College and Hospital for the management and follow-up.

LIMITATION

In present study the data on prevalence of areca nut chewing habit and cause for this practice were collected at the same time which may be associated with temporal ambiguity. Although detailed instructions were provided to subjects before the survey but it may be possible that some questions were unclear to participants and influence the validity of data.

CONCLUSION

The present survey was an attempt to understand the factors responsible for initiation and progression of this habit in school age population. Lack of health consciousness among parents, influence of society and their customs have significant role in induction of habit. It is believed that children who are frequent chewers at early age will develop addiction and will continue this habit into their adult life, engaging themselves into a disease with highest malignant potential. In surveyed schools no oral health programs were conducted in relation to adverse effects of areca nut consumption. Present study statistics showed a worried outcome of these habits where we encounter higher prevalence of OSMF in early age. State and Central ministry of health and education should take serious steps for the cessation of these habits at primary level.

REFERENCES

- [1] Williams S, Malik A, Chowdhury S, Chauhan S. Sociocultural aspects of areca nut use. *Addiction Biology*. 2002;7(1):147-54.
- [2] Kalbande A B, Khakse G M, Priya D, Tamgadge P B. Epidemiological study of oral submucous fibrosis in Yavatmal District. *International Journal of Recent Trends in Science and Technology*. 2013;6(1):38-40.
- [3] Aziz SR. Coming to America: Betel nut and oral submucous fibrosis. *The Journal of the American Dental Association*. 2010;141(4):423-28.
- [4] Gupta S C, Singh M, Khanna S, Jain S. Oral submucous fibrosis with its possible effect on eustachian tube functions: A tympanometric study. *Indian Journal of Otolaryngology and Head and Neck Surgery*. 2004;56(3):183-85.
- [5] Little M A, Pokhrel P, Murphy K L, Kawamoto C T, Suguitan G S, Herzog T A. Intention to quit betel quid: A comparison of betel quid chewers and cigarette smokers. *Oral Health and Dental Management*. 2014;13(2): 512-18.
- [6] WHO collaborating centre for oral precancerous lesions. Definition of leukoplakia and related lesions: An aid to studies on oral precancer. *Oral Surgery*. 1978;-46:518-39.
- [7] Haider SM, Merchant AT, Fikree FF, Rahbar MH. Clinical and functional staging of oral submucous fibrosis. *Br J Oral Maxillo Surg*. 2000;38:12-15
- [8] Lee CH, Chiang SL, Ko AM, Hua CH, Tsai MH. Betel-quid dependence domains

- and syndrome associated with betel-quid ingredients among chewers: An Asian multi-country evidence. *Addiction*. 2014;109(7):1194-204.
- [9] Auluck A, Hislop G, Poh C, Zhang L, Rosin MP. Areca nut and betel quid chewing among South Asian immigrants to Western countries and its implications for oral cancer screening. *Rural Remote Health*. 2009;9(2):1118-27.
- [10] Warnakulasuriya S, Trivedi C, Peters TJ. Areca nut use: An independent risk factor for oral cancer. *BMJ*. 2002;324:799-800.
- [11] Tupkari JV, Bhavthankar JD, Mandate MS. Oral submucous fibrosis (OSMF): A study of 101 cases. *Journal of Indian Academy of Oral Medicine and Radiology*. 2007;19(2):311.
- [12] Rajan G, Ramesh S, Sankaralingam S. Areca nut use in rural Tamil Nadu: A growing threat. *Indian J Med Sci*. 2007;61:332-37.
- [13] Hayes PA. Oral submucous fibrosis in a 4-year-old girl. *Oral Surg Oral Med Oral Pathol*. 1985;59(5):475-78.
- [14] Wang SC, Tsai CC, Huang ST, Hong YJ. Betel nut chewing and related factors in adolescent students in Taiwan. *Public Health*. 2003;117(5):339-45.
- [15] Gupta VK, Malhotra S, Patil R, Tripathi A. Oral submucous fibrosis at pediatric age, now time to think: Series of two cases. *Indian J Med Paediatr Oncol*. 2013;34(2):107-10.
- [16] Strickland SS. Anthropological perspectives on use of the areca nut. *Addiction Biology*. 2002;7(1):85-97.
- [17] Lin YS, Chu NF, Wu DM, Shen MH. Prevalence and factors associated with the consumption of betel-nut among military conscripts in Taiwan. *Eur J Epidemiol*. 2004;19(4):343-51.
- [18] Kuo SC, Lew-Ting CY. The health lifestyles of areca quid-chewing taxi drivers-An exploratory study from the viewpoint of social context. *Taiwan J Public Health*. 2008;27(1):67-80.
- [19] Brandon TH, Baker TB. The smoking consequences questionnaire: The subjective expected utility of smoking in college students. *Psychol Assess*. 1991;3:484-91.
- [20] Gandhi G, Kaur R, Sharma S. Chewing pan masala and/or betel quid-fashionable attributes and/or cancer menaces? *Journal of Human Ecology*. 2005;17(3):161-66.
- [21] Tupkari JV, Bhavthankar JD, Mandate MS. Oral submucous fibrosis (OSMF): A study of 101 cases. *Journal of Indian Academy of Oral Medicine and Radiology*. 2007;19(2):311.
- [22] Nigam NK, Aravinda K, Dhillon M, Gupta S, Reddy S, Srinivas Raju M. Prevalence of oral submucous fibrosis among habitual gutkha and areca nut chewers in Moradabad district. *Journal of Oral Biology and Craniofacial Research*. 2014;4(1):8-13.

PARTICULARS OF CONTRIBUTORS:

1. Reader, Department of Oral and Maxillofacial Pathology, Vyas Dental College and Hospital, Jodhpur, Rajasthan, India.
2. Postgraduate Student, Department of Oral and Maxillofacial Pathology, Vyas Dental College and Hospital, Jodhpur, Rajasthan, India.
3. Professor and Head, Department of Oral and Maxillofacial Pathology, Vyas Dental College and Hospital, Jodhpur, Rajasthan, India.
4. Senior Lecturer, Department of Oral and Maxillofacial Pathology, Vyas Dental College and Hospital, Jodhpur, Rajasthan, India.
5. Postgraduate Student, Department of Oral and Maxillofacial Pathology, Vyas Dental College and Hospital, Jodhpur, Rajasthan, India.
6. Postgraduate Student, Department of Oral and Maxillofacial Pathology, Vyas Dental College and Hospital, Jodhpur, Rajasthan, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Ashish Joshi,
Postgraduate Student, Department of Oral and Maxillofacial Pathology, Vyas Dental College and Hospital
(Rajasthan University of Health Sciences), Kudi Haud, Pali Road, Jodhpur-342008, Rajasthan, India.
E-mail: 40.ashish@gmail.com

Date of Submission: **Apr 29, 2016**
Date of Peer Review: **Jun 11, 2016**
Date of Acceptance: **Jul 18, 2016**
Date of Publishing: **Nov 01, 2016**

FINANCIAL OR OTHER COMPETING INTERESTS: None.