

ASSOCIATION BETWEEN ARECA NUT CHEWING HABIT WITH CARIES AND ORAL HYGIENE STATUS IN YPK GETSEMANI ELEMENTARY STUDENTS RAJA AMPAT REGION

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ABSTRACT

Objective: Areca nut is the most commonly used substance abuse in the world after tobacco, alcohol and caffeine. In Indonesia, the habit of chewing areca nut quid has been consuming most people in the eastern region such as Maluku and Papua. Areca nut (*Areca catechu*) can prevent caries because it has antiseptic properties derived from the content of selenium, tannins and alkaloids. In addition, the formed stain acts as a physical barrier on demineralizing the email. Knowing the dental and oral hygiene's score is important for each individual, it plays a role in preventing the occurrence of caries. Oral hygiene status and caries can be assessed using the OHI-S and def-t index according to WHO.

Methods: This is observational analytic research using a cross-sectional design. Samples are 4th, 5th and 6th grade (aged 8-13 y) students of YPK Getsemani Elementary School, Raja Ampat Regency with total sample number of 50 students. The results were analyzed using SPSS 20 program.

Results: This study indicates 20% caries prevalence, based on WHO category is moderate and def-t averages was 0.46 in the WHO category is very low. Based on chi-square test results obtained $p < 0.05$, indicating that there is a significant association between the frequency of areca nut chewing with caries status.

Conclusion: Caries status in areca nut chewer is very low and there is a significant association between the frequency of areca nut chewing with caries status on children.

Keywords: Def-t index, OHI-S index, Raja Ampat, Chewing areca nut

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INTRODUCTION

Globally, it is estimated that approximately 600 million people are involved in betel quid/areca nut chewing on a habitual basis. Areca nut is widely consumed by all ages groups in many parts of the world, especially south-east Asia. Areca nut is obtained from Areca catechu, a tropical palm tree whereas traditional betel quid ('paan' in local parlance) consists of a mixture of areca nut, slaked lime (calcium hydroxide) and different flavoring agents with or without tobacco enclosed in a In Indonesia, the habit of chewing areca nut quid has been consuming most people in the eastern region such as Maluku and Papua [1-3].

Other side, Chewing Areca has an effect on metabolic syndrome with up to a two-fold increase in risk compared with non-users, Areca nut affects almost all organs of the human body, including the brain, heart, lungs, gastrointestinal tract and reproductive organs. It causes or aggravates pre-existing conditions such as neuronal injury, myocardial infarction, cardiac arrhythmias, hepatotoxicity, asthma, central obesity, type II diabetes, hyperlipidemia, metabolic syndrome, etc. Areca nut affects the endocrine system, leading to hypothyroidism, prostate hyperplasia and infertility [1, 2, 4-7].

Areca nut is the fourth most psychoactive substance worldwide after nicotine, alcohol and caffeine and has been found to influence both the sympathetic and parasympathetic nervous systems causing both stimulatory and relaxing effects. The reasons for chewing may include feeling of euphoria, feeling of warmth inside the body, oral fixation, rituals associated with preparation and a desire to prevent withdrawal symptoms. Epidemiologic studies have revealed betel quid/areca nut chewing to be associated with a number of deleterious effects on the general as well as oral health [1, 2, 8].

In Indonesia, the habit of chewing areca nut often done by people in the eastern region such as Maluku and Papua. This habit performed in all age groups and believed to strengthen teeth and prevent oral malodor. Epidemiological studies have found that the prevalence of caries in areca nut chewers is lower than those that do not. Areca (*Areca catechu*) can prevent caries because of its antiseptic properties derived from the content of selenium, tannins and alkaloids. In addition, the formed stain acts as a physical barrier to

the enamel demineralization. Analysis of areca nut content in the Philippines stated that it contains flavonoid bioactive compounds, one is tannins, which can strengthen teeth and act as an antibacterial substance which destructs bacteria toxin substance and bacteria cell protein. Areca nut chewed with beetle and chalk, which are nutritious for tooth strength. Areca nut boiled water is also used as a mouthwash and tooth strengthener [8, 9].

Dental caries is an infection which damaged tooth surface. This infection caused tooth cavity and pain, tooth loss infection and various dangerous cases. Dental caries is caused by four connected components those are: tooth and saliva include tooth structure and morphology, position of the tooth, salivary pH, the quantity of saliva, saliva viscosity, microorganism in the mouth which produces acids through fermentation eg. streptococcus, lactobacillus, food contains carbohydrates eg sucrose and glucose that can be fermented by certain bacteria to form acids, the component of time. Besides that, dental caries is a major problem and most commonly found in dental and oral diseases. The development of epidemiology in Public Health finds dental caries caused by the role of various interrelated factors (multifactorial), including host (saliva and teeth), agent (microorganism), substrate or diet containing sugar, and time [10-12].

Caries is a tooth defect which can be measured by caries prevalence and DMFT/def-t index. The prevalence of caries is a value that reflects the number of caries sufferers in a given period and time. The def-t index is a measurement index that shows the number of teeth with caries in a person or group of people. Decay (d) is a tooth with a cavity due to dental caries, exfoliated (e) is deciduous teeth indicated for extraction because caries, filling (f) is filled or restored due to caries, and t is teeth. In other words, def-t is the sum of d+e+f, with following categories: 1) very low (0.0-1.1), 2) low (1.2-2.6), medium (2.7-4.4), high (4.5-6.5), and very high (>6.6) [8].

Based on Health Ministry data from Riskesdas 2007, 72.1% of Indonesians had caries experience with caries prevalence of 46.5%. This suggests that dental and oral diseases, especially dental caries are still a major health problem in Indonesia. The Indonesian Ministry of Health in 2008 stated that bacteria are the direct cause of caries, but there are indirect factors such as characteristic of person, habits, behavior, and cultural factors [10].

Several studies both domestic and international studies suggest that chewing areca nut habits affect the oral mucosa and periodontal tissues, plaque formation and calculus, as well as having higher DMF-T and def-t indices category. However, there is few research determine the relationship between the frequency of chewing areca nut with caries status of primary school children in Papua.

MATERIALS AND METHODS

Material

This study was an observational analytical research with cross-sectional design. This research was conducted in YPK Getsemani Elementary School, Saporkren Village, Raja Ampat Regency on October 2017. Sample was determined using a purposive sampling method based on specific inclusion criteria including, having a history of chewing areca nut habit. Exclusion criteria were samples that suddenly refuse to participate in research. The total sample number of 50 students of 4th, 5th and 6th grade with age range from 8-13 y old.

Data were collected through clinical examination and interview about their chewing areca nut habit history. The results are recorded on the examination sheet. Data were processed using the program SPSS version 20.0 (SPSS Inc., Chicago, IL, USA). Analysis of data using Pearson chi-square significant level at $p < 0.05$. According to WHO, the def-t value is divided into five categories: incipient (0.0-1.1), mild (1.2-2.6), moderate (2.7-4.4), advanced (4.5-6.5), and severe (>6.6).

RESULTS AND DISCUSSION

Table 1 shows that most of the samples in this study were female as much as 27 children, while the male sample was 23 children. Most of samples were form 10 y old age group namely 15 children. Beside that, table 2 shows the association between the frequency of areca nut chewing with caries status. The number of samples with very low caries status was found in sample chewing areca nut more than 5 times per day namely 27 children. Based on Pearson chi-square test, $p = 0.038$ ($p < 0.05$) indicated that there was a significant association between areca nut chewing frequency and caries status.

Table 3 shows the relationship between the frequency of chewing areca nut with oral hygiene status. The number of samples which have good oral hygiene status are most commonly found in samples with frequency of chewing areca nut more than 5 times per day as many as 9 people. While the number of samples that have moderate oral hygiene status mostly found in samples chewing areca nut 3-5 times per day. Based on Pearson chi-square test, $p = 0.76$ ($p > 0.05$) indicated that there was no significant correlation between areca nut chewing frequency and oral hygiene status. Table 4 shows the distribution of mean def-t values by gender and age. The highest def-t mean were found in male of 0.24 and in age group of 10 y old i.e. 0.18.

Moreover, table 5 shows the mean distribution of OHI-S scores by gender and age category. The moderate OHI-S score is the highest among all other gender categories. Also by age category, the moderate OHI-S score is also the highest among all other age categories.

Table 1: Sample distribution based on a demographic characteristic

Characteristic	N	%
Gender		
Male	21	42
Female	29	58
Total	50	100
Age		
8 y old	1	2
9 y old	11	22
10 y old	15	30
11 y old	4	8
12 y old	11	22
13 y old	9	18
Total	50	100
Caries		
Present	10	20
Absent	40	80
Total	50	100

Table 2: Association between frequency of areca nut chewing habit and caries status

Chewing frequency	Caries			Total n (%)	p-value
	Incipient	Mild	Moderate		
	n (%)	n (%)	n (%)		
3-5 times each/day	18 (36)	3 (6)	2 (4)	23 (46)	0.038*
>5 times each/day	27 (54)	0 (0)	0 (0)	27 (54)	
Total	45 (90)	3 (6)	2 (4)	50 (100)	

*Pearson chi square $p < 0.05$ significant

Table 3: Association between frequency of areca nut chewing habit and oral hygiene status

Chewing frequency	Oral hygiene status			Total n (%)	p-value
	Good	Fair	Poor		
	n (%)	n (%)	n (%)		
3-5 times each/day	7	9	1	17	0.76
>5 times each/day	9	5	0	14	
Total	20	28	2	0	

*Pearson chi square $p < 0.05$ significant

Table 4: Distribution of mean def-t based on gender and age

Characteristic		N	Caries							
			d		E		f		def-t	
			N	Mean	N	Mean	N	Mean	N	Mean
Gender	Male	21	12	0.24	0	0	0	0	12	0.24
	Female	29	11	0.22	0	0	0	0	11	0.22
Total		50	23	0.46	0	0	0	0	23	0.46
Age	8 y old	1	0	0	0	0	0	0	0	0
	9 y old	11	7	0.14	0	0	0	0	7	0.14
	10 y old	15	9	0.18	0	0	0	0	9	0.18
	11 y old	4	1	0.02	0	0	0	0	1	0.02
	12 y old	11	6	0.12	0	0	0	0	6	0.12
	13 y old	9	0	0	0	0	0	0	0	0
Total		50	23	0.46	0	0	0	0	23	0.46

Table 5: Distribution of oral hygiene based on gender and age

Characteristic		OHI-S			
		Poor	Fair	Good	Total
		n(%)	n(%)	n(%)	n(%)
Gender	Male	1 (2)	13 (26)	7 (14)	21 (42)
	Female	1 (2)	15 (30)	13 (26)	29 (58)
Total		2 (4)	28 (56)	20 (30)	50 (100)
Age	8 y old	0 (0)	1 (2)	0 (0)	1 (2)
	9 y old	0 (0)	4 (8)	7 (14)	11 (22)
	10 y old	1 (2)	12 (24)	2 (4)	15 (30)
	11 y old	0 (0)	2 (4)	2 (4)	4 (8)
	12 y old	0 (0)	5 (10)	4 (8)	9 (18)
	13 y old	1 (2)	4 (8)	5 (10)	10 (20)
Total		2 (4)	28 (56)	20 (40)	50(100)

Based on the results of this study, the prevalence of caries in children in YPK Getsemani elementary school Kampung Saporkren Raja Ampat who have a habit of chewing areca nut is lower 20%, table 1 compared with some other research by Krista *et al.* who examined the condition of caries Papuan tribe in Manado with a prevalence of 70%. The study examined caries of Papuan tribes in Bandung who also had the habit of chewing areca in 2007 (98.75%). In contrast to the Sujatminingsih research in Papuan age 5-50 y old who with and without the habit of chewing areca nut, caries prevalence is 23.2%. The prevalence of dental caries in this study can be caused by the subjects in the research believe that chewing areca nut has a positive effect, including having contains antiseptic properties that can strengthen the teeth. In addition, other content, such as beetle can reduce the incidence of cavities and maintain oral health because they have antioxidant activity [8, 13].

The results of the study were found to be average for children in YPK Getsemani elementary school Kampung Saporkren Raja Ampat who had the habit of chewing areca nut of 0.46; missing 0.00, and filling 0.00 table 4. this average def-t included in low criteria based on WHO (low: 1,2-2,6) and no more than 3 for the def-t score at Oral Health Global Indicators for the year 2015 set by WHO [10].

From the result, we can conclude that chewing areca nut may confer protection against dental caries. The possible reasons that areca nut chewing diminishes dental caries are: Areca nut stain which often coats the surface of the teeth, may act as a physical barrier to tooth demineralization, tannin content may have antimicrobial properties and this may contribute to the cariostatic role, chronic chewers have marked attrition of cusps of teeth leading to loss of occlusal pits and fissures, which may reduce the risk of pit and fissure caries by eliminating potential stagnation areas, the process of chewing itself brings copious amounts of saliva to the mouth and in the presence of added slaked lime may increase the pH in the oral environment, and the increased production of sclerosed dentine in response to attrition may confer protection against microbial invasion [14].

Filling (F) was not found in this study (0); this indicates that the student who live in Kampung Saporkren Raja Ampat and have a habit of chewing areca nut never make a visit to the dentist for dental and oral care. This may be due to the respondent's ignorance for dental

fillings and more choosing to leave his teeth decayed than filled. Thus, efforts are required to motivate the knowledge of dental and oral health that can be embodied in daily oral health behavior. In addition, the study also found that hygiene highest number of samples belong in moderate oral hygiene based on gender and age group. This is due to the accumulation of plaque or areca nut residual debris, on the other hand, the children in this study did not perform tooth brushing procedures either before or after eating and chewing areca nut so this also exacerbates the OHI-S in these children.

CONCLUSION

From this study, it can be concluded that there is a significant association between the frequency of areca nut chewing with caries status on children.

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AUTHORS CONTRIBUTIONS

All the authors have contributed equally

CONFLICT OF INTERESTS

The authors report no conflict of interest

REFERENCES

1. Lawande SA. Betel quid/areca nut chewing and deleterious impact on oral health: is socio-cultural fabric the culprit. J Dent Health Oral Disord Ther 2016;5:1-2.
2. Gupta PC, Warnakulasuriya S. Global epidemiology of areca nut usage. Addict Biol 2012;7:77-83.
3. Garg A, Chaturvedi P, Gupta P. A review of the systemic adverse effects of areca nut or betel nut. Indian J Med Paediatr Oncol 2014;35:3-9.
4. Shafique K, Zafar M, Ahmad Z, Ali Khan N. Areca nut chewing and metabolic syndrome: evidence of a harmful relationship. Nutr J 2013;12:3-5.

5. Boucher BJ, Mannan N. Metabolic effects of the consumption of Areca catechu. *Addict Biol* 2002;7:103-10.
6. Yang NY, Kaphle K, Wang PH, Jong DS, Wu LS, Lin JH. Effects of aqueous extracts of betel quid and its constituents on testosterone production by dispersed mouse interstitial cells. *Am J Chin Med* 2004;32:705-15.
7. Lin CF, Shiau TJ, Ko YC, Chen PH, Wang JD. Prevalence and determinants of biochemical dysfunction of the liver in atayal aboriginal community of taiwan: is betel nut chewing a risk factor. *BMC Gastroenterol* 2008;8:13.
8. Siagian KV. Prevalensi dan pengalaman karies gigi pada suku papua pengunyah pinang di Manado. *J Biomedik* 2012;4:52-7.
9. Tebai Y, Sukartini E, Hayati A. Caries prevalence and dmft index of papuan students with betel chewing habit. *Pac J Dent* 2008;21:41-6.
10. Soendoro T. Laporan hasil riset kesehatan dasar (RISKESDAS) nasional 2007. Jakarta: Badan Penelitian dan Pengembangan Kesehatan, Departemen Kesehatan Republik Indonesia; 2008.
11. Kidd EAM, Bechal SJ. Dasar-dasar Karies. Terjemahan Sumawinata N, Faruk S. Jakarta: EGC; 1992. p. 5-96.
12. Achmad M, Adam AM, Satria A. A cross-sectional study of nutritional status among a group of school children in relation with gingivitis and dental caries severity. *J Dentromaxillofac Sci* 2016;1:150.
13. Yulineri T, Kasim E, Nurhidayat N. Selenium dari ekstrak Areca catechu L. sebagai obat kumur. *J Biodiversitas* 2006;7:18-20.
14. Anand R, Dhingra C, Prasad S, Menon I. Betel nut chewing and its deleterious effects on oral cavity. *J Cancer Res Ther* 2014;10:499-502.