

Prevalence and Characteristics of Areca Nut Chewing Habit among School Going Children in Karachi

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ABSTRACT

Introduction: Areca nut is the fruit of areca catechu palm tree. It is forth most common psychoactive substance used worldwide. Mostly the areca nut chewing habit is prevalent in South Asian countries. Areca nut is used in betel quid or as processed areca nut products. Areca nut is classified as class I carcinogen by IARC. The higher incidence of oral cancer in Pakistan is mostly attributed to the use of areca nut products. In Pakistan studies on prevalence of areca nut chewing habit among children were conducted in highly selected and high risk population. Therefore, there was a need to register the actual prevalence of areca nut chewing habit among the general population of school going children in Karachi.

Objectives: To determine the prevalence of areca nut chewing habit and different characteristics of regular and occasional areca nut chewers among school going children in Karachi.

Methodology: A cross sectional study was conducted in government and private schools of nine towns selected from total eighteen towns of Karachi from January 2010 to June 2012. A stratified cluster random sampling was used to select study sample, representative of all school going children in Karachi. After taking consent a pre tested questionnaire was used to take history of areca nut chewing habit and to record the characteristics of chewers.

Results: A total of 3,107, aged 7-16 years (50.7% female and 49.3% male students) were interviewed and examined. Majority of sample 60.2% were drawn from private schools and 39.8% from government schools. Result showed that 40.8% children chewed areca nut regularly, 39% occasionally and 20.2% rarely. The regular areca nut chewing habit was found mostly among male gender, government school and students of low socioeconomic status. The prevalence of tobacco containing areca nut products use 0.9% was low among children.

Conclusion: The prevalence of areca nut chewing habit among school going children in Karachi was found high (40.8%). The regular areca nut chewing habit was found to be related with addiction potential of areca nut, use of tobacco containing areca nut products and low socioeconomic status of students.

Key words: Areca nut chewing habit, school going children, characteristics of areca nut chewing habit.

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INTRODUCTION

Areca nut is the fruit of areca catechu palm tree, mainly harvested in lands of south East Asia and Pacific islands¹. Areca nut is one of the two basic ingredients of betel quid (wrapped areca nut, catechu paste and slaked lime in a betel leaf)². Areca nut is chewed for its mild CNS stimulating and psychoactive properties³. The independent role of areca nut in oral carcinogenesis

is well documented in literature^{1,4-6}. Areca nut is classified as group I carcinogen to humans by International Agency for Research on Cancer (IARC) in 2004⁷.

It is estimated that 600 million people i.e. 10-25% of the world's population chew areca nut and most of the chewers are concentrated in Asia⁸. Chewing betel quid and areca nut is the part of custom and tradition in some of the communities throughout the Indian subcontinent⁹. Chewing of areca nut by children and women is socially acceptable and it has a cultural place in society⁹ in Indian subcontinent including Pakistan. Areca nut often mistakenly referred as "betel nut"¹⁰ is commonly called "chaliya" in Pakistan. Nowadays areca nut is getting popularity in younger generation in the form of processed areca nut products¹¹. Hence, the market is flooded with pre-packed, scented and colorful packets of areca nut products. Media has played a vital role through aggressive marketing to popularize these products especially in low socioeconomic class children and adolescents.

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So the new scented preparations of the areca nut are the Supari, Mainpuri, Mawa, Gutka and Paan Masala¹¹. Supari consists of roasted pieces of areca nut packed in small sachets. Mainpuri consists of tobacco with areca nut, camphor, cloves and slaked lime. Mawa also contains areca nut with added tobacco and slaked lime. Gutka is prepared by mixing small pieces of areca nut with lime, catechin containing substance, tobacco and fragrances in small aluminum foil sachets. The same product without tobacco is known as “Pan Masala”¹¹. Some brands add small pieces of dried fruits in the Pan Masala.

Areca nut is the fourth most commonly used substance of addiction in the world after nicotine, ethanol and caffeine³. Furthermore, areca nut chewing is widely related to squamous cell carcinoma of oral cavity and esophagus¹². Moreover, many systemic diseases and syndromes for example metabolic syndrome, asthma, cardiovascular events¹³, appetite suppression, general and central obesity¹⁴, chronic kidney diseases¹⁵ and birth weight loss and reduced gestational length during pregnancy¹⁶ are related to the use of areca nut.

The school going children are different from the uneducated children of squatter settlements. It is likely to expect better hygiene and health status among school going children. The prevalence of areca nut chewing habit among school going children reflects the picture of future of our society's oral mucosal health status. The young regular areca nut chewers are the group of children who are at high risk of getting conditions like OSF (oral submucous fibrosis), oral leukoplakia and oral carcinoma in later life¹⁷. Furthermore, the areca nut chewing habit is related to increased tendency of a person to use tobacco in later life¹⁷. Moreover, the risk of morbidity and mortality increases with the early onset of areca nut chewing habit. It also significantly increases the risk of cancer in population. In this prospect the government authorities would require facts and figures to take measures on the prevention of this habit. Oral cancer can be prevented by changing the life style and chewing habits in addition, its early detection at initial stages requires only visual examination of oral mucosa by experts, posing a better challenge to compete¹⁸. The primary prevention of oral cancer was found feasible in a study in India¹⁹. Many studies have been conducted in Pakistan²⁰⁻²⁴ to determine the high risk group of young areca nut chewers who have a high risk of developing pathologies of oral mucosa in future. However, those studies were conducted in highly selected population and the literature search did not reveal any study conducted in Karachi which could be a representative of chewing habit of all school going children in Karachi. In this

prospect a need was felt to document the areca nut chewing habit among school going children in Karachi to effectively develop policies for primary and secondary prevention of areca nut related oral potentially malignant and malignant lesions.

METHODOLOGY

This project was approved by the Institutional Review Board (IRB), Dow University of Health Sciences. Sample size was calculated from OpenEpi, Version 3, open source calculator-SSPropor. The sample size was calculated as 2,818. Adding 10% (281) for many possible drop-outs, the sample size become 3,099, with a confidence interval of $(1-\alpha)$ of 97%, anticipated prevalence of 60% of areca nut chewing habit and margin of error ± 2 . A cross section study was conducted in government and private schools of Karachi from January 2010 to June 2012. A stratified cluster random sampling was used to select study sample, representative of all school going children in Karachi.

Each town of Karachi was considered as a stratum in our study. To facilitate our study we selected nine towns out of total eighteen towns of Karachi by making pair of two towns with almost same socioeconomic status and then by taking one town from each pair by lottery method. Schools were considered as cluster. The list of all government and private schools in the city of Karachi was obtained from the office of ‘City Schooling System of Karachi City District Government’ (CDGK). One private and one government school was selected, from each selected town by random selection. The principals of school were contacted and permission was taken to conduct the study.

The questionnaire was tested for reliability. The students of selected classrooms were briefed about the study and the questionnaires were distributed. There were questionnaire in English as well as in national language, Urdu. The consent statement was written on the form as well as verbal informed consent was taken from students before starting the data collection.

The primary section of questionnaire was designed to register the demographic characteristics of the students i.e. name, age, gender, grade, area of residence and the ethnic group of the students by asking the language spoken at home. The next section determined whether the child was regular chewer or occasional chewer or chewed areca nut. In addition, the age of initiation of areca nut use, brand, amount of use per day, sharing of areca nut with other family members or friends, the place from where it was bought, awareness of parents about areca nut use of their child, whether anyone had

told them to stop the habit, who gave the first packet of areca nut, reasons for areca nut use, feelings when areca nut was not chewed, feelings when areca nut was chewed and awareness of child about carcinogenic effect of areca nut were inquired. Descriptive statistics included frequencies for categorical and continuous variables. Chi square test was applied for the cross tabulation and to find the significant difference between different variables. Independent sample t-test was applied for the difference of means of mouth opening of normal subjects and OSF subjects. Pearson correlation was used for the correlation of age and mouth opening.

RESULT

A total of 3,300 forms were distributed and 3,244 forms were received after completion of the study. The response rate was a healthy 98.30%. A small percentage of forms i.e 1.7 % (108 incomplete forms, 7 forms reporting locked jaw and 22 forms reporting face injury) were excluded. A total of 3,107 forms were left for the final analysis.

Out of 3,107 valid subjects, 1,575 (51.7%) were females and 1,532 (49.3%) were males. The Urdu speaking were the highest 1,213 (39.0%), followed by Sindhi 736 (23.7%), Punjabi 411 (13.2%), Pashtoon 280 (9.0%), Memoni 132 (4.2%), Balochi 69 (2.2%) and any other 266 (8.6%). The average age of the subjects was 11.72 ±2.07 years. The study subjects' age ranged from 7 to 16 years. There were (n=1870) 60.2% private schools and (n=1237) 39.8% government school children, included in the study. Out of 3,107 subjects, 1,269 (40.8%) reported to chew areca nut regularly whereas, 1,210 (39.0%) chew areca nut occasionally and 628 (20.2%) never chew areca nut. More males 729 (47.6%) were regular chewers than the females 540 (34.3%) and only 263 (17.2%) males reported to never chew areca nut as compared to females non chewers 364 (23.1%) and the distribution between male and female subjects differed significantly. Among the regular areca nut chewers the highest were (n=69) 52.3% Memoni, followed by (n=32) 46.4% Balochi, (n=112) 42.1% other languages, (n=503) 41.5% Urdu, (n=294) 39.9% Sindhi, (n=108) 38.6% Pashto, (n=151) 36.7% Punjabi speaking students. The difference of areca nut chewing habit among different ethnic groups was found to be significant (Chi square= 97.174, p= 0.000). Saddar town was found to be most affected with the habit of regular areca nut chewing. A high number (n=213) 54.2% of Saddar town students were regular areca nut chewer, followed by Jamshaid town where (n=184) 48.4% of students were regular areca

nut chewer. The highest prevalence of regular areca nut chewing habit (n=30) 83.3% among government school students was found in Gadap town. The highest prevalence of regular areca nut chewing habit was found among the students of private school of Saddar 51.3% (n=139). Among the government schools students 615 (49.7%) were found to be regular areca nut chewer as compared to 654 (35.0%) of private school regular areca nut chewer students. The government and private students differed significantly (Chi square=69.312, p=0.000).

Table 1: Responses that were most frequently selected

QUESTIONS	Most frequent response REGULAR CHEWERS	Most frequent response OCCASIONAL CHEWERS
Age of initiation of areca nut chewing	9-10 years (27.7%)	After 12 years of age (40.2%)
Preferred brand	"Tara gold" (71.6%)	"Shahi supari" (84.2%)
Sharing of habit with others	With friends (39.2%)	With friends (53.45)
Consumption of areca nut per day	5 sachets (42.1%)	Chewed once in a week or less (60.8%)
Place of purchase of areca nut	Shop near house (64.5%)	Usually do not purchase, chewed when it is presented to them (45%)
Awareness of parents about chewing habit of child	Mother knows (60.5%)	Mother knows (89.2%)
1st packet of areca nut was given by	Friend (63.1%)	At wedding ceremonies (35.7%)
Feeling when areca nut was not chewed	Discomfort (35.8%)	Nothing (78.3%)
Feeling when areca nut was chewed	Relaxed (45.2%)	Pleasure (27.8%)
Awareness of child about areca nut carcinogenicity	Yes (58.4%)	Yes (65.6%)
Cause of areca nut chewing	Craving (26%)	Taste (30.8%)
	To seek pleasure when unhappy (21.8%)	To lower the bad smell of breath (26%)
	To postpone hunger (20%)	When bored (15%)

Table 2: Comparison of prevalence of areca nut chewing habit among government and private schools

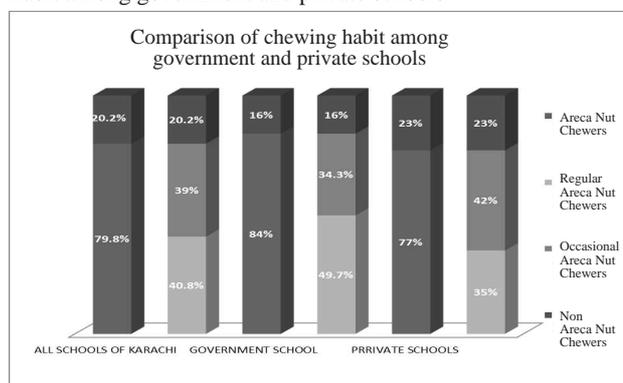
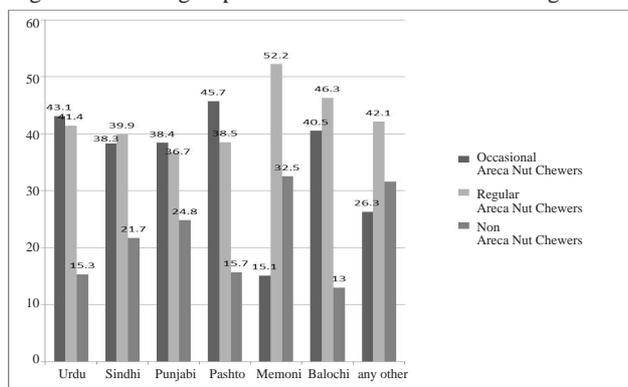


Figure 3 : Ethnic group distribution of areca nut chewing habit



DISCUSSION

It is generally assumed that chewing areca nut is a habit having features common in all chewers of areca nut however; our study revealed different characteristics of areca nut chewing habit in different types of chewers. For example the child who chews areca nut daily is behaving differently when areca nut would be out of reach compared than the child who chews areca nut occasionally. That is why in our study the chewing habit is divided in regular areca nut chewing habit and occasional areca nut chewing habit with a distinct demarcation. As it is evident from data that occasional areca nut chewers consume very low amount of areca nut that is, once in a week or less than it (60%) as compared to regular areca nut chewers who chew 5 sachets in a day regularly (42.1%). Therefore, the regular areca nut chewing is the habit that should be controlled to prevent the consequent pathologies. Regular areca nut chewing is referred to as actual areca nut chewing habit in our study.

According to that division the prevalence of areca nut chewing habit was revealed in our study as 40.8% among school going children in Karachi. As compared to an earlier study carried out by Shah et al in 2009 in three government schools of Mahmoodabad and Chenesar goth²¹ that reported the prevalence of areca nut chewing habit as high as 94% (with 85% regular chewers) and another study by Shah et al in 2002²² reported 74% prevalence of areca nut chewing among primary school children in a fisher island, our result seems to be in contrast with above mentioned studies. In both studies^{21,22} the study samples were drawn from the children coming from poor socio-economic background in low socio-economic areas where majority of children were studying in government school. In our study, the sample was drawn in such a way that represents all school going children in all towns of Karachi having a mix of socioeconomic status of high as well as low and medium.

The sample was further divided into low SES (studying in government school) and medium or high SES (studying in private school) children. In this way, when the children were grouped on basis of type of school that is either government or private school, the prevalence of regular areca nut chewing habit after this stratification was found to be 49.7% among ‘only government school children’ and 35.0% in ‘only private school children’. Furthermore, when the results of chewing habits of regular chewing and occasional chewing were combined then the prevalence of areca nut chewing among government school children was found to be 84.0% and among private school children it was found to be 77%. It seems that the discrepancy between the results of the studies conducted in Karachi by Shah et al (94%, 74%)^{21,22} and our study becomes shorter when the study sample was moulded in this way. Difference in results could be due to difference in methodology and cut off points

It was revealed that most of the occasional areca nut chewers prefer the brands of areca nut which contains smaller amount of areca nut and larger amount of other ingredients (aniseeds and dried fruits). Our data discovered that the brand named ‘Shahi Supari’ was more preferred by occasional areca nut chewers than the regular areca nut chewers (84.2% vs.51.4%). Smaller amount and smaller size of areca nut used in the products e.g. ‘Shahi Supari’ which contains other fibrous elements like aniseeds and small pieces of dried fruits (usually dried dates) along with the occasional chewing practice might be less harmful than the larger amount and larger size of areca nut along with regular chewing of products containing only areca nut e.g. ‘Tara Gold’. The reparative mechanism to fix the damages in oral mucosa caused by the areca nut chewing in occasional chewers might be more effective as it encountered less episodes of areca nut chewing damage and more episodes of repair. That is why the prevalence of regular areca nut chewing and occasional areca nut chewing was mentioned separately in our study. This may serve as an explanation that the prevalence of areca nut chewing habit among school going children in Karachi (40.8%) was not seemingly high in our study as found in the previous studies^{21,22}.

It is also noted that the regular chewers always buy areca nut from shops and occasional chewers usually chew areca nut when it is presented to them. Rozi et al²⁵ in a study in 2007 reported the prevalence of use of tobacco-containing areca nut products and other smokeless tobacco as 16.1% among high school adolescent males in Karachi. These products were mainly ‘Gutka’, ‘betel quid with tobacco’ and ‘Niswar’. In our study only 0.9% students mentioned using tobacco containing areca nut. There may be several reasons for the difference between the prevalence of tobacco containing products use. Both male and female

students from class III to class VIII were included and high school students of class IX and X were not included in our study as compared to only high school male students were included in the above mentioned study. High school boys tend to be more involved in the tobacco containing products used²⁵ whereas, use of tobacco containing products by younger age females is considered unpleasant in our society despite of the fact that use of tobacco containing betel quid is prevalent and acceptable among some of the older age women. Khawaja²⁰ et al reported that only 0.5% women use gutka as compared to 13.5% men using gutka in a slum population in Karachi²⁰. Khawaja²⁰ et al also found that most of the gutka chewers in the slum population in Karachi were non married men and adolescents as compared to married adults. These findings suggested the male adolescents as the main group of gutka chewers. This statement carries weight because our data also revealed that 100% tobacco containing areca nut products were used by boys and most of them (40.9%) were 16 years old. As in our study the female students constituted half of the study sample (50.7%), this might be the reason for lowering of overall prevalence of tobacco use among school going children in Karachi. Other than this Khawaja²⁰ et al conducted the study in slum population in Karachi and found the high prevalence of gutka use among adolescents and adults whereas, our study included small school going children of all Karachi (mostly urban areas) and found very low prevalence of gutka use (0.9%) among the school going children studying in class III to class VIII.

Rozi²⁵ et al conducted the study in three towns of Karachi (Bin Qasim, Malir and Gadap). Those three towns were located at the periphery of the city and their residents were mostly poor and not well educated. Instead of Malir, Jamshaid town and instead of Bin Qasim, Liaqatabad towns were included in our study, which are densely populated and located in the center of city with more facilities of education, civilization and therefore awareness was more likely to be high among the residents. Thus lower prevalence of tobacco use, at least among school going children was found in those towns. Other towns of Karachi with low or no prevalence of tobacco use among children were also included in our study which diluted the overall prevalence. The highest prevalence of 'Gutka' (9.7%) use was found among the students of Gadap town which is near to the prevalence found by Rozi et al²⁵ (16.1%). The use of 'Niswar' was not inquired in our study as it does not contain areca nut. A large percentage of Pathans (24.8%) were found to use niswar in a study by Khawaja²⁰ et al. The focus of our study was on areca nut and tobacco containing areca nut products while use of only tobacco (niswar) was not investigated. This might be the reason for the big difference in the prevalence of tobacco use found in our study and Rozi et al study (0.9% vs.16.1%).

Rozi²⁵ et al reported 47.2% high school male students use areca nut and 12.6% use paan without tobacco, this result is not far from to the prevalence of areca nut use among school children (40.8%) in our study.

The overall image of the areca nut chewing habit (40.8%) and use of tobacco containing areca nut products (0.9%) among school going children in Karachi is relatively better when it is seen among general population. Previous studies^{20-22,24,25} were conducted in high risk population thus provided the concentrated figure of problem (74%²² and 95%²¹ prevalence of areca nut chewing habit). The assumption that school going children of urban areas were expected to have better sense of oral health and oral hygiene than the children of uneducated and unprivileged squatter settlement or the government school children of poor socioeconomic areas is seemed to be true. In the light of evidence found in our study, it could be stated that the more disadvantaged the section of society the more prevalence of areca nut chewing habit found there. As it was also documented in literature that role of occupation, education and socioeconomic status play an important part in development of habit of chewing areca nut and tobacco.

This is an eye opening study which emphasizes on primary prevention (control of areca nut chewing habit) of oral potentially malignant disorders. As oral cancer is a preventable cancer, concentrated and focused efforts are required to educate the general public about areca nut hazards. Definite policy making and total control on areca nut addiction is regarded as important preventive strategy. Government should ban areca nut and its products or the tax on areca nut products import must be increased in order to discourage the business of importing areca nut and its products. Government should ban the advertisement and sponsorship of areca nut and its products. Display of areca nut products on shops should be prohibited. Policies should be developed in order to completely eliminate the areca nut products from school canteens, both in public and private sectors.

As far as the school going children are concerned the easy language lessons about areca nut, gutka and tobacco hazards and signs and symptoms of OSF and oral cancer, with pictures, would be incorporated in the academic syllabus of secondary classes. Exercise of self oral examination would be practiced in schools as a part of curriculum. Some themes or slogans would be fabricated to encourage young generation to boycott areca nut and its products. The slogan "say NO to drugs" could be used to formulate new slogan of "say NO to gutka". Policies could be made to celebrate a week in every school for quitting the habit of areca nut chewing. Poster competitions, speeches and other similar activities would be arranged for school going

children to increase the knowledge and awareness about areca nut hazards. Rewards would be presented to children on quitting the areca nut chewing habit. These simple and easily achievable measures would be effective in reducing the high prevalence of areca nut chewing habit among school going children not only in Karachi but all over the country.

We highly recommend the implementation of above suggested measures to make our country an “areca nut chewing habit free” and ‘oral cancer and OSF free’ state.

CONCLUSION

The prevalence of areca nut chewing habit among school going children in Karachi was found high (40.8%). The regular areca nut chewing habit was found to be related with addiction potential of areca nut, use of tobacco containing areca nut products and low socioeconomic status of students. The two types of areca nut chewers have characteristics different from each other.

REFERENCES

- Shah G, Chaturvedi P, Vaishampayan S. Arecanut as an emerging etiology of oral cancers in India. *Ind J Med Paediatr Oncol* 2011; 33:71-9.
- Nair U, Bartsch H, Nair J. Alert for an epidemic of oral cancer due to use of the betel quid substitutes gutkha and pan masala: a review of agents and causative mechanisms. *Mutagenesis* 2004; 19:251-62.
- Chu NS. Effects of betel chewing on the central and autonomic nervous systems. *J Biomed Sci* 2001; 8:229-36.
- Johnson NW, Warnakulasuriya S, Gupta PC, Dimba E, Chindia M, Otoh EC, et al. Global Oral Health Inequalities in Incidence and Outcomes for Oral Cancer: Causes and Solutions 2011; 237-46.
- Wen CP, Tsai MK, Chung WS, Hsu HL, Chang YC, Chan HT, et al. Cancer risks from betel quid chewing beyond oral cancer: a multiple-site carcinogen when acting with smoking. *Cancer Causes Control* 2010; 21:1427-35.
- Chen YJ, Liao CT, Chen PJ, Lee LY, Li YC, Chen IH, et al. Downregulation of Ches1 and other novel genes in oral cancer cells chronically exposed to areca nut extract. *Head & Neck* 2010; 33:257-66.
- Betel-quid and areca-nut chewing and some areca-nut derived nitrosamines. *IARC Monogr Eval Carcinog Risks Hum* 2004; 85:1-334.
- Gupta PC, Warnakulasuriya S. Global epidemiology of areca nut usage. *Addict Biol* 2002; 7:77-83.
- Verma S. Areca nut (betel nut) chewing: a popular Indian cultural practice and its mucosal implications. *Int J Dermatol* 2011; 50:229-32.
- Gupta PC, Ray CS. Epidemiology of betel quid usage. *Annals of Acad Med* 2004; 33:31-6.
- Gandhi G, Kaur R, Sharma S. Chewing pan masala and/or betel quid-Fashionable attributes and/or cancer menaces. *J Hum Ecol* 2005; 17:161-6.
- Warnakulasuriya S, Trivedy C, Peters TJ. Areca nut use: an independent risk factor for oral cancer. *BMJ* 2002; 6:799-800.
- Yamada T, Hara K, Kadowaki T. Chewing betel quid and the risk of metabolic disease, cardiovascular disease, and all-cause mortality: A Meta-Analysis. *PloS one.* 2013; 8:e70679.
- Lin W, Pi-Sunyer F, Liu C, Li T, Li C, Huang C, et al. Betel nut chewing is strongly associated with general and central obesity in Chinese male middle-aged adults. *Obesity* 2009; 17:1247-54.
- Chou C, Cheng S, Liu J, Cheng W, Kang I, Tseng Y, et al. Association between betel-nut chewing and chronic kidney disease in men. *Pub Health Nutr* 2009; 12:723-7.
- Senn M, Baiwog F, Winmai J, Mueller I, Rogerson S, Senn N. Betel nut chewing during pregnancy, Madang province, Papua New Guinea. *Drug Alcohol Depend* 2009; 105:126-31.
- Chandra P, Mulla U. Areca nut: the hidden Indian 'gateway' to future tobacco use and oral cancers among youth. *Ind J Med Sci* 2007; 61:319-21.
- Mignogna MD, Fedele S, Lo Russo L. The world cancer report and the burden of oral cancer. *Eur J Cancer Prev* 2004; 13:139-42.
- Gupta PC, Mehta FS, Pindborg JJ, Bhonsle RB, Murti PR, Daftary DK, et al. Primary prevention trial of oral cancer in india: a 10-year follow-up study. *J Oral Pathol Med* 1992; 21:433-9.
- Khawaja MR, Mazahir S, Majeed A, Malik F, Merchant KA, Maqsood M, et al. Chewing of betel, areca and tobacco: perceptions and knowledge regarding their role in head and neck cancers in an urban squatter settlement in Pakistan. *Asian Pac J Cancer Prev* 2006; 7:95-100.
- Shah S, Qureshi R, Azam I. Is Chaalia/Pan Masala harmful for health? practices and knowledge of children of schools in Mahmoodabad and Chanesar Goth, Karachi. *J Pak Med Assoc* 2009; 59:550-4.
- Shah SM, Merchant AT, Luby SP, RA C. Addicted schoolchildren: prevalence and characteristics of areca nut chewers among primary school children in Karachi, Pakistan. *J Paeds Child Health* 2002; 38:507-10.
- Qidwai W, Ishaque S, Shah S. Adolescent lifestyle and behaviour: a survey from a developing country. *PLoS One.* 2010; 5:e12914.
- Tanwir F, Altamash M, Gustafsson A. Influence of betel nut chewing, dental care habits and attitudes on perceived oral health among adult Pakistanis. *Oral Health Prev Dent* 2008; 6:89-94.
- Rozi S, Akhtar S. Prevalence and predictors of smokeless tobacco use among high-school males in Karachi, Pakistan. *East Mediter Health J* 2007; 13:916-24.

