# Influence of Betel Nut Chewing, Dental Care Habits and Attitudes on Perceived Oral Health among Adult Pakistanis

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**Purpose:** To survey an adult population in a deprived district of Karachi, with reference to factors influencing perceived oral health.

**Materials and Methods:** Of 1000 questionnaires distributed to households, 994 were returned. The respondents were aged between 30 and 50 years old. Women comprised 49% of the sample.

**Results:** Pan and betel nut chewing had a strong influence on the perceived oral health of the respondents. Pan chewers, 32% of the respondents, had a greater risk of oral problems, odds ratio 3.63. In contrast to other oral problems, dental caries was significantly less frequent among pan chewers (odds ratio 0.63). Betel nut chewing (28%) was less deleterious to oral health: the only significant effects were a higher risk for dental caries, odds ratio 4.51, and more gingival bleeding. While most of the respondents used a toothbrush for oral hygiene, a substantial proportion (27%) used their fingers. The oral hygiene method had no influence on the perceived oral health, nor did consumption of sweets and tea with sugar. Over 80% of the participants seldom or never visited a dentist. Cleaning frequency was significantly associated with oral health: those who cleaned their teeth at least daily had fewer oral problems. Almost all participants considered that eating sweets, smoking, and chewing pan and betel nuts endangered oral health.

**Conclusions:** In this population, typical of deprived urban areas of Pakistan, betel nut habits and frequency of oral hygiene have a strong influence on perceived oral health, while cleaning method and sugar intake do not.

Key words: betel nuts, dental care, oral health, oral hygiene

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Pakistan is a country in southern Asia with a population of 165 million (Central Intelligence Agency, 2007). Only 34 percent of the population lives in urban areas. It is the ninth most populous country in the world. Like many other developing countries Pakistan is experiencing increasing urbanisation. Associated with the changes in social structures are changes in disease patterns and treatment needs.

**Correspondence:** Farzeen Tanwir, Department of Periodontology, Odontology, Karolinska Institutet, Box, 4064, SE-14104, Huddinge, Sweden. Tel: 076 2499765. Fax: 08 7118343. Email: farzeen\_tanwir@yahoo.com, farzeentanwir@hotmail.com Very little information is available about the oral health and dental treatment needs of adult urban Pakistanis. The only data are from a national pathfinder study by Maher (1991), a pilot study conducted on a sample equally distributed in four provinces of Pakistan, comprising 13 urban and rural areas. Dental caries was reported in 78% of adults. The DMFT index was 4.6 in the 35- to 44-year-olds and rose to 18.3 in 45- to 54-year-olds. The percentage of periodontally healthy subjects was 32% at age 12, decreasing to 10.4% at age 50. Calculus was the most frequently observed condition in all age groups.

In an earlier study from our group (Tanwir et al, 2006), we found that more than half of an adult population surveyed in Karachi had perceived oral health problems: the most prevalent were aesthetic problems, followed by pain and dental caries (cavities).

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Betel nut is the fourth most common substance of abuse in the world and is chewed by 600 million people worldwide (Nelson and Heischober, 1999). Its use is particularly common in the subcontinent. Chewing betel nut (supari/pan masala) is very common in Pakistan. It is served on many occasions, especially at weddings. A quid of betel consists of betel leaf (Piper betele), areca nut (from Arecha catechu) and slaked lime (calcium hydroxide), to which tobacco is often added. Other ingredients and flavouring agents are added according to local tastes and preferences. The use of betel nut with or without pan leaves is associated with several diseases, including oral submucous fibrosis. The most serious side effect is oral cancer. According to a recent report from the World Health Organization (WHO), betel quid and areca nut chewing is carcinogenic to humans even when consumed without tobacco (Trivedy et al, 2002; Warnakulasuriya et al, 2002).

Oral cancers are more common in parts of the world where betel quid is chewed. Of the 390,000 oral and/or pharyngeal cancers estimated to occur annually, 228,000 (58%) are in South and South East Asia (Ferlay et al, 2004). The incidence of oral cancers in the Karachi South district is the highest in the world (Bhurgri, 2005). Betel guid is associated not only with oral cancer but also with increased risk of pharyngeal and oesophageal cancer.

Besides cancer, betel nut chewing is also associated with a high frequency of other soft tissue lesions in the mouth (Reichart and Phillipsen, 1998; Trivedy et al, 2002). Areca-induced lichenoid lesions, mainly on the buccal mucosa or the tongue, develop at the sites at which the quid is retained. In chronic chewers, a condition known as betel chewer's mucosa, a discoloured areca nut-encrusted change, is often found at guid retention sites. Areca nut chewing is implicated in oral leukoplakia and submucous fibrosis, both of which are potentially malignant conditions. In Asia, oral cancers often arise from such precancerous lesions (Trivedy et al, 2002).

There are few reports in the literature of the effects of betel nut chewing on the two major oral diseases, dental caries and periodontal disease.

The present study was undertaken in order to collect data about dental care habits, knowledge and attitudes to oral health among adult Pakistanis. The aim was to survey the oral health of an adult population, with special reference to habits, knowledge and attitudes to oral health and perceived treatment needs. A further aim was to investigate the influence of pan and chalia chewing on perceived oral health.

### MATERIALS AND METHODS

Copyrigh Karachi is the most populous city in Pakistan with more than 9 million inhabitants. The study population was selected from the electoral rolls of the P&T (Post and Telegraph) colony of Karachi and represents almost half the adult population of the colony. The colony has a population of 6000 to 10,000 people of all age groups; however, in Pakistan in general, children and young adults predominate. The socioeconomic status is poor. Many people are impoverished and underprivileged, with annual household incomes of less than 50,000 rupees (USD 800). The educational level is mostly intermediate. Males are better educated than females.

The subjects were 1000 adult male and female residents of the P&T colony, stratified according to age: < 35 years, 36 to < 40 years, 40 to < 45 years, 45 to 50 years. Written informed consent was obtained from all participants.

The participants were given a questionnaire in Urdu, their native language, comprising 36 questions covering such topics as socioeconomic status, general health and diseases, oral health and oral health care habits. There were questions about personal characteristics such as age, marital status, number of children in the family and educational level. Information about socioeconomic variables was sought in questions about monthly and annual household income. Income was stratified as < 50,000 rupees, 50,000 to 100,000 rupees, and > 100,000 rupees.

Questions about oral health covered primarily such topics as oral problems (pain, difficulty chewing, cavities, aesthetics, sensitivity and halitosis), dental status (number of teeth) and dental care habits. Most questions were multiple choice but some were open. The question about educational level was open and the participants described their standard of education as primary schooling, secondary schooling, intermediate, or university education to graduate or postgraduate level. With respect to dental visits, the participants could choose from the following responses: never/ seldom, once in 5 years, and yearly.

The questions on oral hygiene habits offered multiple-choice responses. The following options were available for frequency of cleaning: never/seldom, occasionally, and daily. For the question 'How do you clean your teeth', the available options were: 'Toothbrush', 'Miswaq' and 'Finger'.

Regarding dietary habits, the questions about sugar intake (sweets) and tea with sugar offered multiplechoice responses with the following options: never, occasionally, once a day, and  $\geq$  twice a day.

		Gender		Education			10	5
Variable N	All subjects 994	F 484	M 510	Primary 5	Secondary 290	Intermediate 342	Bachelor 304	Master 30
Dental visits %							(ess	ence
Never/Seldom	83	87	81	100	81	84	83	93
Once in 5 years	13	11	15	0	14	13	13	7
Yearly	3	2	3	0	2	3	3	0
Cleaning frequency								
Never/seldom	1	1	1	0	2	1	0.7	0
Occasionally	11	10	12	0	12	10	11	3
Daily	87	88	86	100	84	88	89	93
Cleaning regime								
Toothbrush	72	68	75	40	67	75	72	77
Miswag	1	1	1	0	2	0	1	0
Finger	27	30	24	60	30	24	27	23

With respect to pan, betel (chalia) nut and smoking habits, the question 'Do you eat pan, chalia, and/or smoke cigarettes', had the alternative responses, 'Yes', and 'No'. The question about frequency 'how many pans, chalia packets, or cigarettes per day', offered the following options: 1-5, 6-10, 11-15, and >15.

With respect to oral problems, the participants could choose from the following: pain, chewing difficulties, aesthetics, sensitive teeth, halitosis, tooth mobility, missing teeth, gum recession and others.

The questionnaires were distributed to the participants' homes by a dental auxiliary, who also explained the questions thoroughly. After 1 week the questionnaires were collected by the same dental auxiliary.

The study was approved by the local ethics committee at Karolinska University Hospital, Huddinge, Sweden, and at the Altamash Institute of Dental Medicine in Karachi, Pakistan. It was conducted in accordance with the Helsinki Declaration.

## **Statistical calculations**

Frequency differences between various groups were calculated with Chi-square test. The odd ratios were calculated with univariate logistic regression.

## RESULTS

The response rate was high: of the 1000 questionnaires distributed, 994 were returned. The final participants of the study comprised 510 men and  $484 \ \mbox{women}.$ 

Regular dental visits were the exception: 3% visited a dentist annually and over 80% seldom or never visited a dentist. Women visited the dentist less frequently than men (P < 0.02). There was no association between frequency of dental attendance and age or income. Those with higher education visited a dentist less frequently than the others. Those who seldom saw a dentist had fewer oral problems than those on annual visits (odds ratio [OR] 0.35). With respect to tooth cleaning frequency, there were no differences associated with age or income (results not shown). Most participants cleaned their teeth at least once daily and more than 70% used a toothbrush. The second most common method was finger cleaning (27%) while only a few used a miswag (Table 1). Those who cleaned their teeth only occasionally (less than daily) reported significantly more oral problems than those who cleaned once or more daily (OR 6.11). The cleaning method showed no influence on perceived oral health.

Over 75% of the respondents consumed sweets and/or tea with sugar at least once a day. The sugar intake was unrelated to age, gender, income or education. Sweets and tea with sugar showed no association with oral problems in general. Of respondents, 91% considered consumption of sweets to be potentially deleterious to oral health.

Regarding smoking, 39% of the men smoked, but none of the women. Consumption was higher in the older age groups. Those in the middle-income group (50,000 to 100,000 rupees) tended to be heavier smokers than the lower or higher income groups

		Master	30	10	0	7	ო	30	17	10	ო	10	0	10	0
ed from the income column	Income Education	Bachelor	304	31	9	16	10	29	12	12	4	22	2	13	7
		Intermediate	342	32	e	17	11	22	10	10	2	26	e	12	11
		Secondary	290	36	4	19	13	34	12	13	8	13	1	9	9
		Primary	ى س	0	0	0	0	20	0	0	20	0	0	0	0
vives exclue		>100,000	130	27	2	13	11	16	10	S	1	27	2	16	10
s. Housew		50,000- 100,000	273	32	വ	15	11	21	11	9	0	42	വ	21	17
ated grou	Age	<50,000	148	38	л 2	18	14	27	16	10	1	28	4	16	6
in indic		≥45	320	37	വ	21	12	25	б	11	4	23	0	12	0
e questionnaire in		40-44	260	37	4	14	14	21	7	თ	4	24	2	13	თ
		36-39	325	25	ю	12	10	34	16	12	വ	17	ю	<b>б</b>	9
ering th		35	68	27	0	18	7	33	13	11	7	10	0	9	4
dividuals answe	der	Σ	510	34	4	16	13	18	6	9	2	39	4	20	15
	Gen	ш	484	31	ო	18	o	37	13	16	7	0	0	0	0
entage of in		All subjects	994	32	4	17	11	28	11	11	D	20	2	11	00
Table 2 Perc	Variable		z	Pan chewing %	≤ 5/ day	6-10/day	11-15/day	Betelnut %	≤ 5/ day	6-10/day	> 10/day	Smoking %	≤ 5/ day	6-10/day	> 10/day

(Table 2). Smoking was considered dangerous to oral health by 87% of all participants (94% of men and 80% of women). Of the smokers, 42% had smoked for < 5 years, 19% for 6–10 years, 21% for 11–15 years and 17% for more than 15 years.

Almost one third (32%) of the participants chewed pan, with significantly greater consumption in the older age groups (> 39 years) (P < 0.001). Moreover, consumption was higher in the low-income group (< 50,000 rupees) than in the high-income group (> 100,000 rupees), 38% vs. 27%, P = 0.07 (Table 2). Pan chewers ran a significantly higher risk of oral problems (OR 3.63). This was most pronounced for aesthetic problems but also for pain, difficulty chewing and halitosis. However, dental caries was significantly less frequent among pan chewers (odds ratio 0.63) (Table 3). Pan chewers reported more bleeding gums (< 0.001) and more pockets (P < 0.001).

Of the pan users, 24% had been chewing for < 5 years, 15% for 6–10 years, 31% for 11–15 years and 30% for > 15 years. In response to the question as to whether pan chewing was a threat to oral health, 97% of all subjects considered this habit to be dangerous.

Betel nut chewing was more frequent in women than in men (P < 0.001) and more common in the younger (< 40 years) than the older age groups (P< 0.001). As was the case with pan chewing, betel nut chewing was a more common habit in the low-income than in the high-income group (27% and 16% respectively). The habit was almost equally distributed among the education levels (Table 2). Betel nut chewing was not considered to have as profound an influence on perceived oral health as pan chewing. The only statistically significant factor was a higher risk for dental caries (OR 4.51) and somewhat more gingival bleeding (P < 0.01) (Table 3). Almost all participants (95%: 98% of males and 93% of females) considered betel nut chewing to be bad for oral health.

The duration of chalia chewing was somewhat less than for pan chewing: 36% had chewed for < 5 years, 26% for 6–10 years, 21% for 11–15 years and 18% more than 15 years.

#### DISCUSSION

Much has been written of the effects of pan and betel nut chewing on precancerous and cancerous lesions. There are few reports of the influence of these habits on the two major oral diseases, caries and periodontitis.

The present study shows that Pakistani adults consider pan and betel nut chewing to have a strongly negative influence on perceived oral health. The reported  
 Table 3 Influence of pan or chalia chewing and cleaning frequency on perceived oral health. Percentage of indicated groups that perceive various oral health problems

Variable	Any oral problem	Pain	Chewing difficulties	Cavities	Esthetic	Sensitive	Halitosis
Pan All non-users All users Odds ratio* ≤ 5/day 6-10/day	44 74 <b>3.63</b> (2.69–4.82) 52 71	15 21 <b>1.57</b> (1.12-2.22) 18 24	7 12 <b>2.22</b> (1.38-3.55) 15 6	17 11 <b>0.63</b> (0.42-0.94) 8 11	14 46 <b>5.38</b> (3.94-7.34) 18 44	10 10 1.08 (0.69-1.68) 21 10	20 3.32 (2.23-4.96) 3 21
> 10/day Chalia All non-users All users Odds ratio*	83 53 55 1.10 (0.83-1.46)	17 16 19 1.22 (0.85-1.76)	20 8 7 0.81 (0.47-1.41)	12 9 31 <b>4.51</b> (3.14-6.49)	58 25 21 0.79 (0.56-1.10)	6 9 11 1.26 (0.80-1.98)	22 12 11 0.94 (0.60-1.46)
≤ 5/day 6-10/day > 10/day Cleaning frequency Daily Less than daily	44 56 76 48 85	23 17 11 15 21	4 6 13 6 21	12 34 63 13 26	6 27 43 19 51	13 10 7 9 9	8 9 24 9 26
Odds ratio**	<b>6.11</b> (3.64–10.25)	<b>2.31</b> (1.49-3.58)	<b>2.41</b> (1.54–3.39)	<b>4.38</b> (2.59–7.43)	<b>4.84</b> (3.26–7.19)	0.98 (0.51-1.91)	<b>3.54</b> (2.22–5.64)

\* Odds ratio (95% confidence interval) for having indicated oral problem compared with non-users, calculated with univariate logistic regression. Significant ratios in bold.

\*\*Odds ratio (95% confidence interval) for having indicated oral problem compared with those cleaning daily, calculated with univariate logistic regression. Significant ratios in bold.

use of pan (32%) and chalia (28%) is in agreement with earlier reports from Pakistan, Nepal and India (for review see Gupta and Bay, 2004).

In general, pan chewers had significantly more oral problems. Although the risk was most pronounced for aesthetic problems, pain, difficulty chewing and halitosis were significantly more common among the pan users. Gingival bleeding and pockets were significantly more frequent among pan users while dental caries was reported less frequently.

Some epidemiological studies conducted in South East Asia have shown that betel nut chewers have less caries than non-chewers (Moller et al, 1977; Schamschula et al, 1977; Nigam and Srivastava, 1990). Although the cariostatic mechanism is not clear, several possible explanations have been suggested, e.g. the betel nut stain could work as a protective varnish (Howden, 1984) or the tannins in the betel nuts have an anti-microbiological effect (de Miranda et al,1996).

In our study the pan users reported significantly fewer cavities while the betel nut users reported significantly more cavities. The reason for this discrepancy is unclear but it was unrelated to differences in income or education, Betel nut chewing was more frequent among women (P < 0.001), but there were no gender-related differences in pan use. Betel nut chewing was more common in the younger half of the present population while pan was more common among the older half. However, there was no correlation between perceived oral health problems and gender or age in this population (Tanwir et al, 2006).

To our knowledge, the present study is the first to indicate poorer periodontal health in subjects chewing pan and betel nuts than in non-users. As this study is a questionnaire these findings will need to be validated in clinical studies. Betel nut chewers have been shown to have more calculus than non-chewers (Anerud et al, 1991), and *in vitro* studies have shown that both pan and betel nut extract inhibit keratinocyte and fibroblast growth (Chang et al, 1998; Jeng et al, 1999).

In the present study, 83% of all subjects never visited the dentist. These results are in agreement with those of a previous study in Pakistan (Ishaque and Khan, 2001) but in contrast to a study conducted recently in Saudi Arabia (Al Bader et al 2006).

Almost 87% of the total sample population reported daily oral hygiene routines. Brushing was the most fre-

quent technique (72%). This is in accordance with studies in Pakistan (Khan et al, 1991; Ishaque and Khan, 2001; Iqbal and Ram, 2004) and in Saudi Arabia (Almas et al, 2003).

Our finding that subjects who reported visiting a dentist more frequently had more perceived dental problems than those visiting infrequently indicates that most visits were for treatment of acute conditions rather than for regular check-ups.

Most of the participants used a toothbrush for oral hygiene, but a substantial proportion (27%) used their fingers. There was no difference in perceived oral health between these two groups. In contrast to cleaning method, cleaning frequency showed a significant association with oral health. Those who cleaned once or more daily had fewer problems, particularly with respect to cavities and aesthetics.

Regarding sugar intake, more than half the study population consumed sweets once a day, with females being higher consumers, while more males drank tea with sugar twice or more a day. This is in agreement with an earlier study conducted in Pakistan (Qidwai et al, 2003).

This study is the second in a project intended to describe the oral health of underprivileged adult Pakistanis. It can be assumed that the P & T colony is representative for most low-income areas in the city of Karachi and that the conditions disclosed by this survey of the residents are typical of many underprivileged Pakistani adults. The population of this colony had low oral health awareness, which did not seem to be related to income or education. This implicates that improved oral hygiene and regular dental checkups are not part of their lifestyles.

It is important to emphasise that this study is based on a questionnaire and not on clinical examinations. Thus while it cannot provide information about actual oral health status, it does describe perceived oral health problems, and hence, subjective treatment needs.

In conclusion, the present study shows that in this population, betel nut chewing and oral hygiene frequency have a strong influence on perceived oral health, while cleaning method and sugar intake do not.

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