Smokeless tobacco consumption in a multi-ethnic community in Pakistan: a cross-sectional study

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استهلاك التبغ بدون تدخين في مجتمع متعدد الإثنيات في باكستان: دراسة مستعرضة

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الخلاصة: يشيع استخدام التبغ بدون تدخين في جنوب آسيا. وهو بالإضافة إلى أنه يسبب سرطان الفم والبلعوم، فإن آثاره الضارة يمكن مقارنتها مع تعاطي التبغ بالتدخين. وقد أجرى الباحثون دراسة مستعرضة بأخذ عينات منهجية في العامين 2010-2011 لمعرفة مدى استخدام التبغ بدون تدخين في مجموعة سكانية شبه حضرية ومتعددة الإثنيات في إسلام آباد، باكستان، وبلغ عدد العينات 2030 عينة. واتضح للباحثين أن معدل انتشار استخدام التبغ بدون تدخين قد بلغ 16.0 ٪ (21.6 ٪ بين الذكور و8.8 ٪ بين الإناث)، كما أن 51.7 ٪ ممن يستخدم التبغ بدون تدخين كانوا يدخنون السجائر. وقد كان معدل استخدام التبغ بدون تدخين مرتفعاً لدى ذكور باختون (38.2 ٪)، ولدى إناث السند (22.4 ٪) مقارنة مع غيرهم. وقد كان هناك ترابُط يُعتدُّ به إحصائياً بين استخدام التبغ بدون تدخين وبين الإثنية، والفئة العمرية، ومستوى الدخل، وتدخين السجائر وذلك بين من يستخدم التبغ بدون تدخين من الذكور. وكان 41.4 ٪ من العينة (840 فرداً من بين 2030 فرداً) لا يمتلكون معارف كافية عن المشكلات الصحية التي تترابط مع استخدام التبغ بدون تدخين. وتمس الحاجة إلى تدخلات ملائمة لرفع مستوى الوعي حول المخاطر الصحية وللوقاية من استخدام التبغ بدون تدخين.

ABSTRACT Smokeless tobacco is commonly used in south Asia. In addition to causing oral and pharyngeal cancers, its harmful effects are comparable to smoking tobacco. A cross-sectional survey with systematic sampling was conducted in 2010–2011 to investigate smokeless tobacco use in a multi-ethnic, semi-urban population in Islamabad, Pakistan (*n* = 2030). The prevalence of smokeless tobacco use was 16.0% (21.6% among males and 8.8% among females); 51.7% of smokeless tobacco users were also cigarette smokers. The rate of smokeless tobacco use was comparatively high among Pakhtun males (38.2%) and Sindhi females (22.4%). The associations between smokeless tobacco use and ethnicity, age group, income level and cigarette smoking were statistically significant among male smokeless tobacco users. Of the sample 41.4% (840/2030) had inadequate knowledge about the health problems associated with smokeless tobacco. Appropriate interventions are needed to raise awareness of the health risks and to prevent smokeless tobacco use.

Consommation de tabac sans fumée dans une communauté pluriethnique au Pakistan : une étude transversale

RÉSUMÉ La consommation de tabac sans fumée est courante en Asie du Sud. Outre les cancers de la cavité buccale et du pharynx, ses effets nocifs sont comparables à ceux de la consommation de tabac à fumer. Une enquête transversale à partir d'un échantillonnage systématique (n = 2030) a été menée en 2010 et 2011 afin d'évaluer la consommation de tabac sans fumée dans une population semi-urbaine et pluriethnique à Islamabad (Pakistan). La prévalence de la consommation de tabac sans fumée était de 16,0 % (21,6 % chez les hommes et 8,8 % chez les femmes) ; 51,7 % des consommateurs de tabac sans fumée étaient aussi des fumeurs de cigarettes. Le pourcentage de consommation de tabac sans fumée était comparativement élevé chez les hommes pachtounes (38,2 %) et les femmes sindhies (22,4 %). Les associations entre la consommation de tabac sans fumée, le groupe ethnique, la tranche d'âge, le niveau de revenu et la consommation de cigarettes étaient statistiquement significatives chez les consommateurs de tabac sans fumée de sexe masculin. Au sein de l'échantillon, 41,4 % (840/2030) possédaient des connaissances insuffisantes sur les problèmes de santé liés au tabac sans fumée. Des interventions appropriées sont nécessaires pour sensibiliser aux risques sanitaires et prévenir la consommation de tabac sans fumée.

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Introduction

Smokeless tobacco products, which are not burnt but are utilized orally or nasally, have been used in different countries for centuries and are accessible in many different forms *(1,2)*. The prevalence of smokeless tobacco consumption varies across and within different countries, depending on factors such as socioeconomic status, ethnic origin, sex and age *(1,3)*. These products are most commonly used by south Asian communities, in which around one-third of tobacco is consumed in smokeless form *(2)*. Smokeless tobacco consumption is a threat to public health. It is associated with oropharyngeal, laryngeal, oesophageal and pancreatic cancers, cardiovascular diseases, adverse outcomes of pregnancy and dental disease *(4)*. Furthermore, studies indicate that the use of smokeless tobacco products appears to be increasing, particularly among the younger age groups *(5–7)*.

The consumption of smokeless tobacco products in low- and middle-income countries is of particular concern because the products are manufactured and sold without proper regulation and are often consumed with other carcinogenic substances *(2)*. In Pakistan, a low-income country, smokeless tobacco is consumed mainly in the form of *naswar* (tobacco flavoured with cardamom and menthol) *(2)*, *paan* or betel quid (containing tobacco, lime, areca nut and other flavourings) *(8)*. Despite its widespread use in Pakistan, little empirical research has been carried out on the prevalence and determinants of smokeless tobacco consumption. Studies about the association of use of smokeless tobacco and other substances, such as areca nut, with head and neck and oral cancers have been conducted in certain regions of Pakistan, often with a small sample size *(8–14)*. Similarly, a study in Karachi reported a 16% prevalence of smokeless tobacco use among 772 adolescent high-school males *(10)*. The prevalence of smokeless tobacco use among various ethnic groups and their knowledge and perceptions concerning to its health implications is not known. We investigated these factors in a semi-urban population in Nurpur Shahan in the outskirts of Islamabad. The population is approximately 14 000, consisting of people who are migrants from all provinces and represent different ethnic groups and sociocultural backgrounds

Methods

A cross-sectional survey with systematic random sampling was conducted from January 2010 to January 2011. We measured self-reported use of smokeless tobacco, types of products used and individuals' perceptions and knowledge of the related health implications.

Study setting

Nurpur Shahan was selected as the surveillance site. This urban slum was chosen because it has settlements from all provinces and represents a relatively marginalized segment of the society.

Sampling

The sample was first stratified into males and females. With a precision of + 3%, and an expected prevalence of smokeless tobacco of 50% in the community and 95% confidence interval (CI), the sample size was estimated as 992 in each group (males and females). To account for possible incomplete data, the sample size was increased to 1015 each, a total of 2030. The sample size was inflated by only 2.3%, because the interviewers were well trained, as pilot-testing further strengthened the rigorous methodology and because the interviews were conducted face-to-face, ensuring completeness of questionnaires.

Males and females aged 5–65 years who were permanent residents of the area and gave informed consent were included in the study. Children aged 5 years and above were included in the study because previous studies conducted in South Asian communities has reported smokeless tobacco use in the age range of 5–10 years *(15,16)*.

A systematic sampling technique was applied. In each street of the locality, we surveyed the first house followed by the third, fifth and so on. When a particular street was completed, subsequent streets was approached in a similar fashion. The study was conducted by groups of 4 students, each including at least 1 female, as per the cultural norms of the community. Once a house was selected all members of the family that met the eligibility criteria were consented and then interviewed.

Data collection

Questionnaire

The questionnaire components were compiled utilizing previously validated questions. The questionnaire included 3 sections. The first section was to determine the following sociodemographic variables: age (from date of birth or, if unavailable, estimation of age with reference to an index event) *(17,18)*; education (number of years of formal education completed) *(17–19)*; ethnicity (determined from place of birth and ethnic origin in Pakistan) *(20)*; and income (as rupees per month) *(17,18)*. The second section enquired about respondents' tobacco consumption: type of smokeless tobacco products used; amount and frequency of use; and cigarette smoking habits. Smokers were define as current and ever-smokers *(8–12,15–20)*. In the third section respondents answered 5 questions designed to assess their knowledge and perceptions about the health implications associated with smokeless tobacco use *(8–12,15–20)*.

The questionnaire was first pilot-tested in a few households to address any ambiguity. The questions was translated into Urdu language and then back-translated into English to ensure content validity.

Training of the interviewers

The survey was carried out by trained undergraduate medical students as part of their scheduled public health practice field visits. Eight teams, each consisting of 4 students, administered the survey. The students had prior experience of conducting surveys in the same community. The students were formally trained in taking informed consent, administering the questionnaire in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology checklist for conducting cross-sectional studies *(21)*.

Interviews

The survey questionnaire was administered through face-to-face interviews. A non-coercive approach was adopted, and the participants were not offered any incentives to participate in the survey. Illiterate respondents were given a verbal explanation about the purpose of the research, and informed consent was taken; they were asked to give a thumbprint if they could not sign. A quality assurance framework was used to ensure consistency and quality *(22)*. Moreover, verification checks were done on 5% of the sample *(17)*. The response rate of the survey was 99%.

Ethical considerations

Ethical clearance for this study was obtained from the ethics committee at Shifa College of Medicine in December 2009. Written informed consent was obtained from all participants in the survey and all data collected were kept confidential. In the case of children (5–13 years old) informed consent was taken from adults in the household.

Data analysis

The data were entered into *SPSS*, version 19.0 statistical software. All categorical variables were presented as frequencies and percentages. The relationship between 2 categorical variables was calculated by cross-tabulation and applying chi-squared test and estimating *P*-values.

Results

A total of 2030 individuals were surveyed including 1132 (55.8%) males and 898 (44.2%) females. The prevalence of smokeless tobacco use in the total sample was 16.0% (324/2030): 21.6% (245/1132) among males and 8.8% (79/898) among females. The rate of tobacco smoking among male smokeless tobacco users was 188/245 (76.7%) and among female smokeless tobacco users was 49/79 (62.0%). Of the participants 54 (2.6%) reported being daily consumers of *paan* mixed with tobacco and 84 (4.1%) as daily *naswar* users (Figure 1).

Analysis by ethnic groups showed the highest prevalence of smokeless tobacco use was among Sindhi (23.9%) followed by Pakhtun (22.3%), with Punjabi (12.3%) and Urdu speaking (16.0%) groups reporting the lowest prevalence (Table 1). The prevalence of smokeless tobacco use was highest in the age group 30–39 years (23.6%). Furthermore, smokeless tobacco use was highest among male users in age groups 11–20 years (38.4%) whereas among females it was highest in ages 50+ years. The prevalence of smokeless tobacco was lowest among the participants earning 9000+ rupees per month and those with the highest level of education.

The association between smokeless tobacco use and age group, ethnicity, income level and cigarette smoking was statistically significant ($P < 0.001$) among male smokeless tobacco users (Table 2). Among female smokeless tobacco users there was a significant association between smokeless tobacco use and income level, education and ethnicity. In the total sample education was the only variable that was not significant ($P = 0.06$).

Nearly half (41.4%) of the study sample had inadequate knowledge about the health problems associated with smokeless tobacco and 34.1% of the sample perceived smokeless tobacco use as harmless. Only 15 (0.7%) participants suspected an association of cardiovascular disease with smokeless tobacco use and even fewer (0.4%) reported an association of smokeless tobacco with adverse outcomes of pregnancy (Table 3).

Discussion

Smokeless tobacco is an important public health concern in south Asian countries, as such products are manufactured at a mass scale without any checks on the carcinogenic content of the products and information to the public about their harmful health effects *(2)*. The consumption of smokeless tobacco

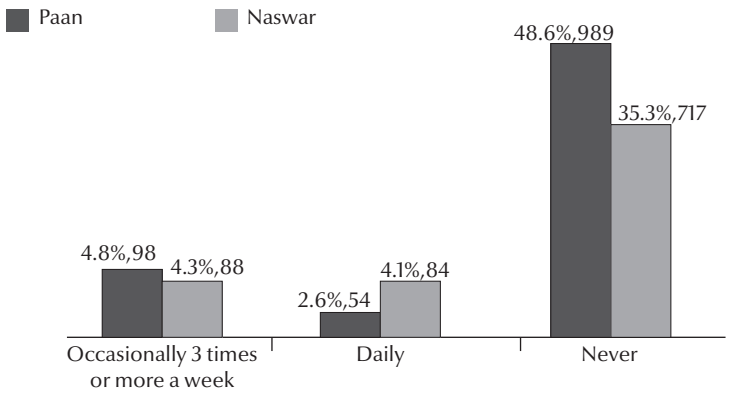

Figure 1 Respondents' self-reported frequency of use of different smokeless tobacco products (*n* = 2030)

Table 1 Prevalence of smokeless tobacco use by demographic characteristics of males and females

Variable	Both sexes				Males				Females			
	Total	Smokeless tobacco users			Total	Smokeless tobacco users			Total	Smokeless tobacco users		
	No.	No.	%	95% CI	No.	No.	%	95% CI	No.	No.	%	95% CI
Overall	2030	324	16.0	14.3–17.5	1132	245	21.6	19.2–24.0	898	79	8.8	7.0–11.0
Age (years)												
5–10	269	13	4.8	2.3–7.4	159	10	6.3	2.5–10.0	110	3	2.7	0.3–5.7
11–20	388	81	20.9	16.8–24.8	185	71	38.4	31.3–45.3	203	10	4.9	1.9–7.8
21–29	442	84	19.0	15.3–22.7	267	62	23.2	18.1–28.3	175	22	12.6	7.7–17.5
30–39	246	58	23.6	18.3–28.9	147	48	32.7	25.0–40.2	99	10	10.1	4.2–16.0
40–49	383	42	11.0	7.8–14.0	204	25	12.3	7.8–16.8	179	17	9.5	5.2–13.8
50–59	200	29	14.5	9.6–19.4	115	18	15.7	8.9–22.2	85	11	12.9	5.8–20.0
> 60	102	17	16.7	9.4–23.8	55	11	20.0	9.4–30.6	47	6	12.8	3.2–22.2
Ethnicity												
Punjabi	1127	139	12.3	10.4–14.2	612	102	16.7	13.6–19.5	515	37	7.2	4.9–9.4
Pakhtun	452	101	22.3	18.5–26.1	228	87	38.2	31.8–44.4	224	14	6.3	3.1–9.5
Sindhi	134	32	23.9	16.6–31.0	85	21	24.7	15.5–33.8	49	11	22.4	10.7–34.1
Balochi	44	9	20.5	8.5–32.3	30	7	23.3	8.2–38.4	14	2	14.3	4.1–32.5
Urdu speaking	162	26	16.0	10.4–21.6	103	16	15.5	8.5–22.5	59	10	16.9	7.3–26.5
Other	111	17	15.3	8.6–22.0	74	12	16.2	7.8–24.6	37	5	13.5	2.5–24.5
Income per month (rupees)												
< 2000	288	49	17.0	12.1–21.8	90	21	23.3	14.6–32.0	198	28	14.1	9.2–18.9
2000–3499	389	65	16.7	12.9–20.4	96	60	62.5	52.8–72.2	293	5	1.7	0.2–3.2
3500–4999	470	78	16.6	13.2–19.9	184	49	26.6	20.2–32.9	286	29	10.1	6.6–13.6
5000–8999	629	117	18.6	15.6–21.6	525	101	19.2	15.8–22.6	104	16	15.4	8.4–22.2
9000+	254	15	5.9	3.0–8.8	237	14	5.9	2.9–8.9	17	1	5.9	0.31–16.9
Education												
None	1048	178	17.0	14.6–19.2	392	129	32.9	28.2–37.5	656	49	7.5	5.4–9.4
Primary	227	39	17.2	12.2–22.0	178	29	16.3	10.8–21.7	49	10	20.4	9.1–31.7
Middle	267	45	16.9	12.3–21.3	159	39	24.5	17.8–31.2	108	6	5.6	1.2–9.8
Matric	185	32	17.3	11.8–22.7	125	26	20.8	13.7–27.9	60	6	10.0	2.4–17.6
Intermediate	135	16	11.9	6.4–17.2	119	9	7.6	2.8–12.4	16	7	43.8	19.4–68.0
Graduate and above	168	14	8.3	4.1–12.5	159	13	8.2	3.9–12.5	9	1	11.1	0.4–31.6
Cigarette smoking												
Smoker	458	237	51.7	47.1–56.3	395	188	47.6	42.7–52.5	63	49	77.8	67.4–87.9
Non-smoker	1572	87	5.5	4.4–6.6	737	57	7.7	5.8–9.6	835	30	3.6	2.3–4.9

CI = confidence interval.

among males in the study is comparable to the rates observed in India (26.4%) according to the Global Adult Tobacco Survey (GATS) household survey *(23)*. However, consumption among females was much lower than the rate observed in Indian (18.4%) and Bangladeshi (27.9%) females *(23)*. When compared with the Global Youth Tobacco Survey (GYTS) conducted in Pakistan the prevalence among male smokeless tobacco users in the study sample exceeded the rate (13.8%) among male users surveyed in the GYTS, whereas among female users it was similar (7.4%) *(24)*. Smokeless tobacco use started at an early age in our population, and this is similar to the studies conducted in 3 different rural areas of India and the state of Goa *(15,16)*.

Paan mixed with tobacco and *naswar* were found to be the 2 commonest types of smokeless tobacco products used, and this agrees with previous

Table 2 Relationship of ethnicity, age groups, education, cigarette smoking and income with smokeless tobacco use

Variable	Significance of association with smokeless tobacco use					
	Total		Males		Females	
	χ^2	*P*-value	χ^2	*P*-value	χ^2	*P*-value
Age	53	0.001	59.3	0.001	11.5	0.07
Ethnicity	31.7	0.001	34.7	0.001	10.9	0.05
Education	10.5	0.06	9.15	0.103	11.5	0.04
Income	23.0	0.001	31.2	0.001	51.1	0.001
Cigarette smoking	607	0.001	111.3	0.001	5.2	0.02

findings from Pakistan *(11–13)*. The consumption of *naswar* (53.0%) can be explained by the presence of a Pakthun and Balochi ethnic groups in the sample who have a cultural tradition of using this product *(12,13)*.

The association between education level and smokeless tobacco use was not significant in the total sample ($P = 0.06$); however, nearly half of our sample consisted of people with no formal education and the sample size was therefore insufficient to detect associations within other categories. The rate of smokeless tobacco consumption fell to 8.3% when education levels increased to graduate and above, a finding similar to a study conducted in Rawalpindi, Pakistan *(17)*. The low level of awareness among our participants about the health implications associated with smokeless tobacco highlights the need for health education campaigns to raise awareness in the community.

This was not a countrywide survey using a sampling strategy that was representative of the whole Pakistan population. Instead, the study was conducted in a diaspora population representing major ethnicities living in the country. Education and income levels in the community differ from those in the urban cities and the associations between smokeless tobacco and socioeconomic factors may vary if cross-sectional studies with a representative sample size were conducted there. However 66% of the Pakistani population lives in rural areas *(25)* and the education and income levels in this community study may correspond with the rural population of Pakistan. The awareness levels regarding the health implications associated with smokeless tobacco may also be different in the urban cities where education levels are higher and people have more access to information in the form of social and electronic media.

The consumption of smokeless tobacco at an early age and high prevalence among particular ethnicities suggests that there may be a cultural acceptance of the habit among this urban slum community. This may also be influenced by level of education and awareness about the health implications associated with smokeless tobacco. Smokeless tobacco use is culturally embedded within South Asian communities *(2)*. Furthermore, it will be worthwhile focusing future research on the ethnic and cultural context. Information about the health implications associated with smokeless tobacco use need to be more widely dispersed in the form of mass health education and media campaigns. The different ethnicities highlighted in this research reside in other geographical locations within our country and also form ethnic minorities in different countries. The findings of this research can be applied to such communities living abroad. Appropriate

Table 3 Knowledge and perceptions of the respondents about the health implications associated with smokeless tobacco use

Variable	Respondents agreeing (*n* = 2030)		
	No.	%	95% CI
Smokeless tobacco has carcinogenic tendencies and can cause oral cancers and cancers of other body organs	251	12.3	10.8–13.7
Smokeless tobacco use can lead to cardiovascular disease	15	0.7	0.3–1.1
Smokeless tobacco used can lead to adverse outcomes of pregnancy	9	0.4	0.1–0.7
Smokeless tobacco can lead to dental diseases	223	11.0	9.6–12.4
Smokeless tobacco has no associated health implications	692	34.1	31.9–36.1
Don't know or have no relevant knowledge	840	41.4	38.9–43.1

CI = confidence interval.

health interventions should be designed to prevent smokeless tobacco use which should be culturally and ethnically adapted.

The findings of this research suggest that tobacco control policies need to encompass and address smokeless tobacco consumption and not just focus on cigarettes. This could involve incorporating questions about smokeless tobacco consumption into national surveys Moreover, research into effective policies and cessation support options should be conducted with prime focus on the provisions of the WHO Framework Convention on Tobacco Control. More research is required to investigate the social determinants of smokeless tobacco use among the different ethnic minorities and the constituents of the smokeless tobacco products consumed in the country

Competing interests: None declared.

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