Full Length Research Paper

Smokeless tobacco consumption among public and heavy load drivers in Karachi, Pakistan: A cross-sectional study

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Tobacco use remains a major cause of preventable morbidity and mortality worldwide. The World Health Organization states that 19.1% of the Pakistani population consumes smoked or smokeless tobacco (SLT). Although many population focused studies have focused on the use of SLT in Pakistan, but they have failed to address the use of SLT among laborers, especially the niche population of public and heavy load drivers (that is, transporters). This study aimed to estimate the prevalence of SLT consumption among this population and the relationship of this parameter with knowledge, attitudes, and practices regarding SLT use. From a sample size of 714 participants, 615 responses were obtained, generating an overall response rate of 86%. The prevalence of SLT consumption in the study population was 93.7%; here, gutka was the most frequently consumed preparation (60.2%), followed by naswar (35.8%), paan (32.4%), and Mawa (16.7%). A masticatory habit was the most commonly cited factor leading to dependence (87.8%), followed by the influence of friends and family (83.9%), peer pressure (80.7%), and increased alertness (52.8%). However, 61.3% of participants reported experiencing strong withdrawals upon ceasing SLT use and believed themselves to be addicted and unable to quit usage. These findings suggest that for transporters, a high-risk occupational group dependent on SLT consumption, specific, tailored tobacco-cessation programs and medical assistance are needed to reduce the burden of tobacco-related morbidity and mortality.

Key words: Smokeless tobacco (SLT), tobacco use, gutka, heavy load and public drivers, transporters, Karachi.

INTRODUCTION

For approximately 20% of the human population, the chewing of betel, areca, and tobacco represents an integral component of the cultural fabric, and in such cultures, these substances have been strongly accepted

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among all age groups (Norton, 1998). Reports have described the frequent use of betel, areca, and tobacco in several areas of the South Asian subcontinent (Qidwai et al., 2002; Gupta and Sreevidya, 2004; Qureshi et al., 2013). Although more than 300 million adults in at least 115 countries consume smokeless tobacco (SLT), these products are used with particular frequency in both South and Southeast Asia. For example, SLT is used regularly by a quarter of adults in Bangladesh and India and by 16.3 and 2.4% of male and female Pakistani residents, respectively (Siddiqi et al., 2016).

In Pakistan and most other regions of the Indian subcontinent, the most popular forms of chewed product are paan, chalia, gutka, naswar, tambaku, and naas (Johnson, 2001). Although these products vary with respect to production, all share the main ingredients of betel, areca, and tobacco (IARC, 2004; Mack, 2001). In recent decades, industrially prepared substitutes for these chewing products were introduced to the market. The less expensive nature and a longer shelf life contributed to sales growth and the development of an export market for these products (Johnson, 2001). Studies of the Indian population have attributed an estimated 49 and 90% of oral cancers among men and women to chewing habits (Van-Wyk et al., 1993; Balaram et al., 2002). Similarly, a Pakistani study reported that betel, areca, and tobacco chewing were associated with an 8.5 to 10-fold increase in the risk of oral cancers, after adjusting for other covariates (Merchant et al., 2000). Consistent with the reported prevalence of SLT use, studies have estimated that 58% of all head and neck cancers worldwide occur in South and Southeast Asia (Nair et al., 2004; Ferlay et al., 2015).

To date, a small number of studies have been conducted to estimate the prevalence of chewing habits among different age and occupational groups in Pakistan (Qidwai et al., 2002; Qureshi et al., 2013). One study of hospital outpatients in Karachi City reported betel and tobacco chewing rates of 20 and 17%, respectively (Khan and Qidwai, 2013). In another study, very high rates of daily areca use in different combinations (ranging from 1.3% in a gutka mixture to 52% alone in sweetened form) were twice reported among primary school children, with increasing frequency from lower to higher grades. This finding was attributed to the lack of restrictions regarding the purchase of these products within and outside the school premises (Qureshi et al., 2013).

Another study conducted in Karachi found that approximately 40% of the participants used at least one chewed betel, areca, or tobacco product on a daily basis, with a 2.46-fold higher prevalence among males than females and 1.39-fold higher prevalence among adolescents than adults (Mazahir et al., 2006). Other population studies of SLT consumption have focused on medical students, physicians and staff at tertiary care hospitals (Imam et al., 2007; Khan and Qidwai, 2013), and residents in a squatter settlement (Mazahir et al., 2006). By contrast, no previous studies have evaluated

the established prevalence of SLT consumption among transporters, a neglected population in terms of targeted anti-tobacco campaigns.

Observations suggest that majority of public and heavy load drivers (that is, transporters) chew betel quid because of its effect as a stimulant, with the intent to remain awake for longer periods of driving time. In addition, socio-cultural factors that may encourage betel quid and SLT use must be considered when studying transporters in Pakistan. To address the limited data available for this occupational group at high risk for tobacco consumption, a study was conducted in Karachi city, which encompasses a range of ethnic and socio-cultural populations from across Pakistan, with the aims of estimating the prevalence of SLT consumption among transporters and determining the knowledge, attitudes and practices associated with tobacco use in this group.

METHODS

Study design

Sampling

Twenty-one towns within Karachi were divided into three zones: Karachi East, Karachi Central, and Karachi West, each of which contained seven towns. Karachi is a metropolitan and industrial city that serves as a national economic corridor, and its population comprises diverse ethnic and cultural backgrounds. These 21 town sites are representative of this diversity. Using a reported 19.1% prevalence of tobacco consumption in Pakistan (Saqib et al., 2017), a 95% confidence interval, and 5% margin of error; the initial calculated sample size was 238. Hence, the total sample size for all three zones was set as 714.

Study population and location

Initially, 34 transporters were randomly selected for interviews from main transport stations in each of the 21 towns in Karachi. Public and industrial cargo transport stations in the following towns were sampled: Kemari, Port Qasim, Baldia, Orangi, SITE, Saddar Town, Lyari, Landhi, Karachi and Clifton Cantoment, Shirin Jinnah Colony, Akhtar Colony, Punjab Chowrangi, Malir town and Cantonment, Sohrab Goth, Safoora Goth, Korangi Town, Toll Plaza, Gulshan Town, Nazimabad Town, North Nazimabad, and North Karachi. Of the 714 approached drivers, 615 met the inclusion criteria and consented to participate in this survey, yielding an overall response rate of 86%

Operational definitions

SLT

This is also known as chewable or oral tobacco, used in the form of betel quid (pan), gutka (gutkha), mahwa (mawa), and naswar (naas).

Public drivers

These local drivers operate public buses, coaches, wagons, and

Table 1. Socio-demographic characteristics and addiction patterns of heavy load and public drivers

Demographic variable	n	Frequency (%)
Age groups		
≤ 20	43	7.0
21 - 45	493	80.2
> 45	79	12.8
Occupation		
Public drivers	476	77.4
Heavy load drivers	139	22.6
Duty hours		
Short (<6 hrs)	63	10.2
Moderate (7-12 h)	335	54.5
Long (12 -16 h)	208	33.8
Extra-Long (>16 h)	9	1.5
SES (in PKR, Pakistani Rupee)		
Low (<15000 PKR)	369	60.0
Middle (15-30000)	236	38.4
High (>30000)	10	1.6
Addiction profile*		
Tobacco Smoking (Cigarette/Bidi)	353	57.4
Alcohol	111	18.0
Gutka (Gutkha)	370	60.2
Naswar (Naas)	220	35.8
Pan (Betel Quid)	199	32.4
Bettle Nut (Areca Nut)	161	26.2
Mawa (Mahwa)	103	16.7
Perceptions regarding SLT use**		
Perception 1: Improves alertness (or Wakefulness)		
Yes	325	52.8
No	290	47.2
Perception 2: Peer pressure		
Yes	496	80.7
No	119	19.3
Perception 3: Influenced by family or community		
Yes	516	83.9
No	99	16.1
Perception 4: Masticatory habit		
Yes	540	87.8
No	75	12.2
Perception 5: Tried to quit, but addicted		
Yes	377	61.3
No	238	38.7

*(subjects were dependent on multiple addictions, thus percentages are not additive). **SLT comprise of Gutka, Naswar, Pan and Mawa only.

mini-buses (with two axles) and primarily transport passengers within cities or, occasionally, within states.

Heavy load drivers

These drivers are licensed to operate heavy (trucks/ lorries with three or four axles) and extra-heavy vehicles (oil tankers/ industrial cargo trucks with more than four axles).

Transporters

All public and heavy load drivers are generally classified under this broad category.

Duty hours

These were categorized as short (<6 h), moderate (7 to 12 h), long (>12 h), and extra-long routes (>16 h).

Socio-economic status (SES)

This factor was assessed using the average household income and ratio of family members. Specifically, SES was defined using three monthly income (in Pakistani Rupees, PKR) categories: low SES, or an income of <PKR 15000; middle class, or a PKR of 15000 to 30000; and high class, or an income of >PKR 30000.

Inclusion criteria

Licensed drivers aged 18 to 60 years were eligible to participate after consenting to complete the full questionnaire and provide details about their personal lifestyle (for example; SES, addiction history, and knowledge/attitudes related to SLT use).

Exclusion criteria

Drivers who did not provide consent or were unwilling to complete the questionnaire or disclose the required information were excluded from the study.

Ethical concerns

The study protocol was reviewed and approved by the institutional review board (IRB) of Dow University of Health Sciences. Informed and written consent (in Urdu) was obtained from each study participant prior to inclusion in the study.

Study tool

Socio-demographic information was collected using a pre-tested structured questionnaire drafted in the local language (Urdu) to facilitate comprehension.

In addition to demographic information (for example; sex, age, education, ethnicity), the participants were categorized in terms of their duty hours and SES as described in the "Operational Definitions".

An addiction profile (Table 1) was established based on the participant's smoking habits, use of betel nut, use of alcohol, and the use of the four major types of SLT (paan, gutka, mahwa, and naswar).

Table 2. Comparative analysis of "public and heavy load drivers" with "duty hours" and "SLT consumption": results of a chi-square test representing 'occupational dependence.

Factors related	Public drivers' n (%)	Heavy load drivers' n (%)	p-value (chi-square)
SLT Consumption			
Yes	441 (92.6)	136 (97.8)	0.025*
No	35 (7.4)	03 (2.2)	
Duty hours			
<6	54 (11.3)	09 (6.5)	
7-12	282 (59.2)	53 (38.1)	<0.01*
>12	133 (27.9)	75 (54.0)	
Others	7 (1.5)	2 (1.4)	

*Measure of significance, p-value<0.05.

Statistical analysis

The statistical package for social science, version 21.0 (SPSS Inc., Chicago, IL, USA) was used for data entry and analysis. Frequencies and percentages were calculated to obtain summary values. Odds ratios with 95% CIs were computed using logistic regression analysis to assess the degrees of associations between the use of SLT and independent variables. Significance was set at a p-value < 0.05. Variables with p-values ≤ 0.2 in the univariate logistic regression analysis, were further included in the multivariable analysis.

RESULTS

Demographic variables

As noted above, 615 of the 714 approached transporters fulfilled the inclusion criteria (response rate = 86%) in which none of the participants were female. Table 1 presents the socio-demographic details of the study participants. All participants ranged in age from 18 to 60 years, although most of the participant (80%, n = 493) were between 21 and 45 years of age. Approximately 77.4% (n = 476) of the participants were public drivers. A comparative analysis of heavy load drivers and public drivers (Table 2) with respect to duty hours revealed that majority of heavy load drivers reported >12 h (54%), whereas majority of public drivers (59.2%) reported 7 to 12 h which is a significant difference (p-value <0.01). Among all transporters sampled, 60% (n = 369), 38.4% (n = 236), and 1.6% (n = 10) were classified as having a low, middle, and high SES, respectively.

Addiction profile

Table 1 illustrates varied addiction profile amongst which smoking of tobacco, betel nut and alcohol consumption were considered as confounding variables. Table 3 presents a detailed distribution of the use of all types of SLT, either alone or in combination. The prevalence of SLT use among the total sample of transporters was 93.7% (number of drivers using any kind of SLT divided by the total sample (n = 615) × 100). Majority of drivers (n = 328, 53.3%), used a single type of SLT available in Karachi, although 194 (31.5%) participants reported the use of two or more types of SLT. As highlighted above, participants with SLT addictions were also prone to different addiction combination patterns (Table 3) in which drivers also provided multiple responses regarding their perceptions of SLT use (Table 1). Here, roughly 96% of drivers perceived that SLT helped to improve wakefulness and improve work activity and a chewing habit was most frequently cited among the reasons for consuming tobacco products (87.8%), although a majority of participants (80.7%) also reported that they had been introduced into the habit by work colleagues. In response to an inquiry regarding attempts to quit the use of SLT, 61.3% believed that they were addicted after experiencing strong withdrawals during previous attempts to quit.

Occupational dependence

Tables 4 and 5 present the results of analyses that evaluate the relationships of socio-demographic factors with the use of SLT. In the univariate logistic regression analysis, the variables of occupation and duty hours were found to significantly associate with SLT use (respective p-values: 0.009 and 0.0374). Furthermore, the likelihood use of SLT was 1.46 times higher among transporters with duty hours of 7 to 12 (COR: 1.457, 95% CI: 0.831 to 2.544). Similarly, duty hours > 16 induced 3.7 times higher chances use of SLT as compared to transporters with shorter duty hours (COR: 3.727, 95% CI: 0.849 to 16.36) (Table 4). Subsequently, independent variables with p-values ≤0.2 in the univariate analysis were included in the multivariable analysis (Table 5). It was found that the risk of use of SLT among heavy load drivers was 0.634 times versus public drivers (p-value = 0.033). Although moderate, long and extra-long duty

Table 3. Distribution of types of smokeless tobacco (SLT)* consumption among heavy load and public drivers

Types of SLT (n=615)	Frequency	%
Single Item Users	328	53.3
Combination of two items users	194	31.5
Paan + Gutka	74	12
Paan + Naswar	16	2.6
Paan + Mawa	10	1.6
Mawa + Gutka	27	4.4
Mawa + Naswar	13	2.1
Gutka + Naswar	54	8.8
Combination of three items users	41	6.7
Paan + Gutka + Mawa	9	1.5
Paan + Mawa + Naswar	8	1.3
Paan + Gutka + Naswar	17	2.8
Gutka + Mawa + Naswar	7	1.1
Combination of all four items users		
Gutka+ Mawa + Naswar + Paan	13	2.1
Non users	39	6.3

hours were found to significantly associate with use of SLT in the univariate analysis but this significance was not retained in the multivariable analysis.

DISCUSSION

Oral lesions related to SLT consumption are a significant source of morbidity and mortality and have been identified as the sixth-most common cause of head and neck cancers in Southeast Asia (WHO, 2009). In Pakistan, laborers and individuals with a low SES face a considerable risk of oral malignancy due to the increasing prevalence of oral tobacco use. Our study findings indicate that effective measures to enhance awareness among SLT consumers are urgently needed to reduce the burden of this habit on overall health.

In this study, we evaluated a population of mostly younger male drivers. Our population was similar to that of a previous Indian study in which the majority of study population, which comprised mostly of laborers, followed by drivers and businessman, ranged in age from 20 to 30 years (Narasannavar and Wantamutte, 2014). Similarly, a study conducted of so-called blue collar workers (that is, construction trades, maintenance/repair, production/machinery, transport/material moving) in the USA aimed to highlight occupational dependence on SLT and found that this relationship was most prevalent among the construction trades (Noonan and Duffy, 2014). By contrast, the current study focuses on the niche

population of public and heavy load drivers, which is highly dependent on SLT consumption and has been neglected in previous Pakistani studies.

Furthermore, our study coverage of all 21 towns within the metropolis of Karachi is a major strength. Specifically, Karachi serves as the port and largest city of Pakistan and features the highest levels of commercial and business activity, as well as a highly ethnically and culturally diverse population. Therefore, the results from our sample can be easily generalized at a regional level.

Since initiating our study in 2015, extensive search of the related literature has been conducted and accordingly very recent Nepalese study (Saroj et al., 2017) of bus drivers and their staff was identified, which serves as a stepping stone toward highlighting this neglected population. However, the results of that study could not be generalized, as the sample was limited by localization to a single bus station and lacked evidence to indicate occupational dependence. By contrast, this study is unique in highlighting occupational dependence on SLT and proving a statistical relationship between stressful, prolonged duty hours and SLT dependency among public drivers. Furthermore, analysis revealed a statistically greater dependence on SLT use among public drivers, who are more subject to the stresses of heavy (usually urban) traffic, hectic routines, and time zone pressures relative to heavy load drivers, who drive largely in areas with comparatively little traffic congestion (that is, highway routes). It was found that duty hours were an important factor with respect to a dependence on SLT, particularly for those reporting at least moderate duty hours.

Notably, the use of SLT was significantly higher among heavy load drivers with duty hours exceeding 16 h, likely indicating a dependence on SLT products to refresh their minds and relieve the stress of continuous driving. It was also observed that a strong prevalence of low SES was found in this study and similar to the prevalence observed in a previous Pakistani nationwide study (Mazahir et al., 2006). Another study observed that addiction is very strongly correlated with lack of education, awareness and poor dietary patterns (Ahmed, 2016), as observed in this population, considering the study population were skilled laborers (drivers) belonging to low SES.

Betel, a common ingredient of all types of local and industrially prepared SLT (IARC, 2004), has many cultural uses and roles, including its effects as a mild stimulant as well as a source of psychological and physiological addiction (Bhisey, 2012; Norton, 1998). Betel use can increase the plasma concentrations of norepinephrine and epinephrine, thus stimulating the autonomic and central nervous systems to produce a sense of well-being, euphoria, heightened alertness, perspiration, salivation, a sensation of elevated body temperature, thus increased capacity to work (Osborne et al., 2011; IARC, 2004; Chu, 2001).

These theories clearly support the findings regarding

Table 4. Univariate analysis (Crude OR) of factors associated with smokeless tobacco use

Variable	OR (95% CI)	P-value
Age		0.776
≤ 20	1	
21 - 45	0.894 (0.475--1.682)	
> 45	1.049 (0.495--2.226)	
Occupation		0.009*
Public drivers	1	
Heavy-load drivers	0.582 (0.388--0.873)	
Duty hours		0.034*
Short (<6 h)	1	
Moderate (7-12 h)	1.457 (0.831--2.554)	
Long (12 -16 h)	0.945 (0.523--1.710)	
Extra-Long >16 h	3.727 (0.849--16.366)	
Socio economic status		0.318
Low (<15000 PKR)	1	
Moderate (15000-30000)	1.148 (0.823-1.603)	
High (>30000)	2.426 (0.673-8.745)	
Improves alertness		0.084
No	1	
Yes	1.33 (0.962-1.839)	
Peer pressure		0.589
No	1	
Yes	0.89(0.596-1.342)	
Influenced by family or community environment		0.150
No	1	
Yes	1.39(0.887-2.19)	
Masticatory habit		0.141
No	1	
Yes	1.47(0.88-2.46)	

*P-values significant at 5%, OR = odds ratio, CI = confidence interval, PKR = Pakistani rupee.

the significant associations between duty hours and dependence on SLT (Table 2), as well as the widely held perception by drivers that SLT use increases work efficiency by increasing alertness (Table 4). This perception can be attributed to the previous finding that continuous mastication enhances activity levels during long duty hours; in other words, chewing improves wakefulness (Osborne et al., 2011; Chu, 2001). This may be further supported by the observed association of gum chewing with pre-frontal cortex stimulation and, consequently, increased alertness (Sketchley-Kaye et al., 2011). Conclusively, continuous mastication is associated with increased signs of alertness and consciousness.

In a recent survey of SLT consumers in Bangladesh and Pakistan (Azam et al., 2016; Siddiqi et al., 2016), the respondents indicated that their decisions to begin SLT use were influenced by peer pressure, family acceptance, easy access, low price, lack of regulation, wide cultural acceptance, curiosity, and hospitality. Among drivers in our study with a low SES who were unable to afford chewing gum, SLT served as a cost-effective, albeit addictive and alternative option for maintaining alertness during long duty hours. These influences were also found to be highly significant within our study population (Tables 4 and 5). Furthermore, a Pakistani national prevalence study (Qidwai et al., 2002) of tobacco

Table 5. Multivariable analysis (adjusted OR) of factors associated with smokeless tobacco use.

Variable	*OR (95% CI)	P-value
Occupation		0.033*
Local drivers	1	
Highway drivers	0.634 (0.417-0.964)	
Duty hours		0.116
Short (<6 h)	1	
Moderate (7-12 h)	1.438 (0.816-2.534)	
Long (12 -16 h)	1.049 (0.573-1.920)	
Longest (>16 h)	3.749 (0.837-16.797)	
Influenced by family or community environment		0.138
No	1	
Yes	0.705 (0.445-1.118)	

Adjusted for improves alertness and masticatory habit, *P-values significant at 5%, OR - odds ratio, CI= confidence interval.

consumption trends among male residents in which paan was most frequently used, followed by naswar, gutka, hookah, bidi, and shisha smoking, contradicts the findings of the present study, wherein gutka use was highly prevalent (Table 1). Findings were attributed to the soft, easily chewable consistency of gutka and its wide availability at shops and transport stations throughout Karachi. (Johnson, 2001; Gilani and Leon, 2013)

This study has a few limitations of note. Although a sufficient number of drivers were included, the sample predominantly comprised public drivers, which might have affected the results. This imbalance was attributed to the fact that data were obtained only from transit heavy-load transport stations in Karachi, and heavy load drivers might have been on route for long driving periods. In addition, the data regarding SLT use were self-reported and may have been over or under-reported. Moreover, this study did not further 'age-stratify drivers' within the broad range of 21 to 45 years of age, and accordingly opportunity might have been missed to evaluate the role of age in terms of SLT consumption. Finally, it lacked recording further perceptions related to SLT dependance.

Preventive programs will only be effective if SLT users are willing to quit and cooperate with preventive strategies (Saroj et al., 2017; Ahmed, 2016; Kakde et al., 2012). Interestingly in this study, 377 participants (61.3%) reported that they had tried to quit because of emerging awareness and health concerns. However, they resumed use after experiencing strong withdrawal symptoms and because of a perceived occupational dependence on SLT. A similar study of factors related to behavioral interventions aimed at SLT cessation in Pakistan and the UK reported that 33 to 63% of SLT consumers were attempting to cease use of these addictive products but were unsuccessful because of peer pressure, isolation,

and inconsistent motivation (Siddiqi et al., 2016). Similarly, as evident (Table 4 and 5) SLT consumption is 3-fold related to extra-long duty hours (>16), which alone is significant in univariate analysis; whereas in the presence of reduced (or No) influence by family or community environment, it might no longer remain significant as seen in multivariable analysis. Therefore, no matter how long the duty hours are, there is a need to raise awareness among these drivers to be aware of poor influences from family and community environment.

Therefore, the tailoring of targets is strongly recommended, preventive SLT cessation programs for this community, in consideration of their physiological and psychological characteristics. Community outreach programs that provide medical and dental consultations and psychological counseling sessions to drivers and their families, as well as a media campaign, would be the most useful resources for a successful "Quit SLT" program.

Conclusion

SLT consumption is widespread among public drivers in Karachi. Although nearly all types of SLT were used by both public and heavy load drivers in our study, gutka was most frequently used, followed by various combinations of SLT types. The implementation of preventive programs aimed at reducing SLT consumption in this population, should target eliminating poor influences of family and community; as previous programs have neglected this population. Furthermore, we note that any intervention intended to reduce SLT use should target the risk factors related to its use in given population.

ETHICAL APPROVAL

CONFLICT OF INTERESTS

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