

Original Research Article

Knowledge, attitudes, practices, and prevalence of nicotine pouches in Pakistan: where do we stand?

Muhammad Talha Nawaz¹, Ayesha Nasir Hameed¹, Fatima Yasin¹, Meher Angez¹,
Khujasta Gul³, Omar Irfan², Javaid Ahmed Khan^{2*}

¹Medical College, ²Department of Medicine, Section of Pulmonary and Critical Care Medicine, Aga Khan University Hospital, Karachi, Pakistan

³Medical College, Multan Medical and Dental College, Multan, Pakistan

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*Correspondence:

Dr. Javaid Ahmed Khan,

E-mail: Javaid.Khan@aku.edu

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ABSTRACT

Background: Nicotine pouches (NPs) are a relatively new type of oral smokeless tobacco-free nicotine product which are considered an alternative nicotine delivery system to help quit smoking. There is little information available about the safety and composition of NPs, and yet they are being widely endorsed by various influential institutions. Our study aimed to assess knowledge, attitude, and practices (KAP) regarding NPs among the Pakistani population.

Methods: A large cross-sectional study was conducted using an anonymous online survey. The survey included questions regarding demographics, and KAP of NPs. Descriptive, univariate and multivariate analyses were performed to establish any relationship between the exposure variables (sociodemographic factors) and the outcome variables (KAP scores).

Results: A total of 1749 participants were included in the final analysis. The mean age of the respondents was 20.6 years. The overall mean score of knowledge and attitude was 3.0 and 4.75 respectively. Around 40.0% of participants had adequate knowledge while 50.6% had a negative attitude towards NPs. Overall, 17.2% of the respondents reported using NPs. Results showed that there was no difference in cigarettes used before and after the start of nicotine pouches (median=3, IQR=2-6).

Conclusions: NPs are being marketed in Pakistan at a rapid rate despite very little information about their adverse effects. Our study demonstrates scanty knowledge of NP in the Pakistani population, and advocates education about harmful effects of NP. Larger interventional studies are needed to investigate potential adverse effects of NP consumption which can aid in the regulation and marketing of this product.

Keywords: Cigarette smoking, Nicotine, Nicotine pouches, Smoking, Tobacco

INTRODUCTION

Nicotine pouches (NPs) are a relatively new type of oral smokeless tobacco-free nicotine product. NPs are small receptacles that contain white nicotine powder which a user places in between upper lip and gum, leaving nicotine to release.¹ These products are sold as pre-portioned pouches similar to snus, but instead of containing tobacco leaf, these are filled with white nicotine-containing powder extracted from tobacco

leaves.² NPs are sold in a variety of fruit (e.g., black cherry, citrus) and other (e.g., peppermint, coffee) flavors, and vary in nicotine content per pouch (e.g., Dryft: 2 mg and 7 mg; Velo: 2 mg and 4 mg; Lyft: 4 mg and 6 mg).³ Companies use product descriptors such as “tobacco-free” or “tobacco leaf-free” in product marketing which has surely contributed towards an increasing trend in consumption as they are new, and large companies are branding them as safe to use but without any evidence.

Studies conducted at a global level to assess the prevalence of smokeless tobacco and nicotine products show a rising trend in consumption. A survey conducted among 121 countries in 2015 reported that there were 352 million users (351.9 million) in 121 countries and nearly 95% (333.1 million) of these lived in developing countries especially in south-east Asia region.^{4,5} Similarly, the studies in Europe have been showing similar rising trends in smokeless tobacco and nicotine consumption. Sweden reported an increase of 10-fold in consumption which was significantly higher than the rest of Europe with more prevalence observed in males than in females.⁶ The use of nicotine and smokeless tobacco products in Asian countries such as India, Bangladesh, Sri Lanka, and China have also shown an upward trend in the recent years.⁷⁻⁹ Over 22 million people in Pakistan also smoke tobacco.¹⁰ NPs are being marketed as an alternative nicotine delivery system to assist in quitting smoking. A study using a cross sectional survey with 351 undergraduate students from rural India showed that reasons for using smokeless tobacco and nicotine products included a desire to stop using tobacco cigarettes (29.51%).¹¹ Furthermore, studies conducted in Pakistan also show that nicotine products are becoming a mainstream trend as alternates for the conventional cigarette smoking.^{12,13} However, the studies conducted in Pakistan are very few, and limited to small population sizes with paucity of nationwide studies. Many factors have been seen to influence the use of smokeless tobacco and nicotine products and result in the increased global, regional, and local prevalence rates.

The widespread marketing and increasing consumption of NPs such as VELO due to availability in wide range of flavours and be able to use discreetly, has perhaps appealed to the youth and the young adults. In addition to their adverse effects and the potential to cause dependence, there lies paucity of evidence of KAP of NPs from developing nations like Pakistan. Our study aimed to assess knowledge, attitude, practices, and prevalence of use of NPs among Pakistani population. Having data from various cities will lead us to determine the cities with highest prevalence of use of NPs and hence allow for targeted interventions to reduce the use of NPs in those specific cities. Moreover, being the first study done across Pakistan and targeting the general population without any other restrictions, it will give a numerical prevalence of NPs in the country which is still unknown and will provide a benchmark for future research on the topic.

METHODS

Study design and setting

This study was conducted in the general population of Pakistan during March to May 2022, as a cross-sectional study using an anonymous web-based survey after obtaining permission from Ethical Review Committee of the Aga Khan University, Karachi, Pakistan (reference

ID: 2021-6362-18200). A non-probability purposive sampling technique was used to collect the data. The questionnaire was produced by using google forms and was spread on various internet forums in both English and Urdu language to address the language barrier during data collection. The study included people residing in various provinces, cities, states, and districts of Pakistan, irrespective of age, having internet access and access to the link of the Google form, and were willing to give consent were included in this study.

Study instrument and data collection

A pre-validated KAP questionnaire was modified slightly according to the topic and was administered as an online form.¹⁴ All data collected via the Google forms was stored in the Google drive protected by password, which was only accessible by the principal investigator and co-investigators. Each participant was given an auto generated code number in order to maintain privacy. A pilot study in 50 participants was conducted to ensure clarity and compliance, following which necessary changes were made accordingly and these responses were discarded.

The questionnaire was administered in both English and Urdu language. Consent from adults and parental consent and assent from minors was taken before filling out the questionnaire. The questionnaire had five sections. The first section consisted of sociodemographic variables; age, gender, marital status, province, occupation, income, and education. The second section was past medical history and the third, fourth and fifth sections collected data on knowledge, attitude, and practices respectively. The knowledge and attitude responses were converted to scores and were accumulated to measure the final scores. In the knowledge sections, 6 questions were scored. The respondents were given score of 1 for agreeing with the statement and 0 for not agreeing or choosing I don't know. The total maximum score for the knowledge section was 6 and the cut off for adequate knowledge was kept at a score of ≥ 4 . Similarly in the attitude part, 8 questions were scored, the total maximum score for attitude section was 8 and the cut off for negative attitude was kept at a score of ≥ 5 . Negative attitude is considered as people disliking and considering NPs to be as harmful.

Data analysis and sample size

A minimum sample of 1051 individuals were required to carry out the study successfully. Sample size was calculated via Openepi software with a 95% significance level, 2% absolute precision and an anticipated prevalence of NP users ranging from 9.4% to 11.2%.^{5,15} Data from the Google forms was converted to an Excel Spreadsheet from where statistical analysis was conducted using SPSS version 26. Continuous data was represented as means and standard deviation, whereas categorical data was represented as frequencies and proportions. Descriptive analysis was performed to assess

the prevalence and sociodemographic factors of the study population. Univariate analysis was performed to establish any relationship between the exposure variables (sociodemographic factors) and the outcome variables (KAP scores). Independent T-test/Mann-Whitney test was performed to find any association between all exposure and outcome variables. Pearson correlation test was used to assess any correlation between age, total knowledge, and attitude scores. A p value of less than 0.05 was treated as significant.

RESULTS

Socio-demographic characteristics

A total of 1749 responses were collected in the study. Among these, 1078 (61.6%) were female and 671

(38.4%) were male. The age of the respondents ranged between 13-56 years with a mean (SD) age of 20.6 (3.6) years. The majority of the respondents belonged to Punjab (58.7%) province followed by Sindh (27.6%). The household income was greater than 60,000 Pakistani rupees (PKR) for 41.9% of the participants. Table 1 shows detailed distribution of socio demographic variables.

Medical and smoking background

Among the 1749 participants, 7.1% respondents reported a diagnosis of hypertension while 6.6% reported having asthma. Almost 40% of the participants reported a previously diagnosed psychiatric illness while 53.2% believed themselves to be currently under stress (Table 1).

Table 1: Descriptive characteristics of study population (n=1749).

Variables	N (%)
Age, years	20.6±3.6
Age, median (IQR)	20 (19-22)
Gender	
Male	671 (38.4)
Female	1078 (61.6)
Province	
Punjab	1027 (58.7)
Sindh	482 (27.6)
Baluchistan	21 (1.2)
KPK	195 (11.1)
Kashmir	15 (0.9)
Gilgit Baltistan	9 (0.5)
School education	
Schooling	120 (6.9)
inter/A level	1000 (57.2)
Bachelor	518 (29.6)
Master and above	111 (6.3)
Chief wage earner's monthly income	
>60,000	733 (41.9)
30,000-60,000	268 (15.3)
22,500-30,000	125 (7.1)
15,000-22,500	116 (6.6)
9,000-15,000	97 (5.5)
3,000-9,000	103 (5.9)
<3,000	307 (17.6)
Past medical history	
HTN	124 (7.1)
Asthma	116 (6.6)
Have you ever been diagnosed with depression/anxiety/any psychiatric illness?	
Yes	664 (38.0)
No	1085 (62.0)
Would you say that you are currently under any kind of stress?	
Yes	930 (53.2)
No	516 (29.5)
Don't know	303 (17.3)

Table 2: Knowledge, attitude and practices regarding NPs.

Questions	N (%)
Knowledge regarding nicotine pouches	
Do you know what nicotine pouches are?	
Yes	1339 (76.6)
No	410 (23.4)
If yes, then how did you learn about them?	
Internet	1002 (63.4)
Friends	395 (25.0)
TV	115 (7.3)
Magazines	34 (2.2)
Newspaper	29 (1.8)
Family	6 (0.4)
Are you aware of the various ingredients and chemicals in nicotine pouches?	
Yes	560 (32.0)
No	1189 (68.0)
Do u know about the level of nicotine present in nicotine pouches?	
Yes	422 (24.1)
No	1327 (75.9)
Are you aware that nicotine pouches are addictive?	
Yes	1334 (76.3)
No	165 (9.4)
Don't know	250 (14.3)
Are you aware that nicotine pouches contain chemicals that may have long-term health implications?	
Yes	1129 (64.6)
No	336 (19.2)
Don't know	284 (16.2)
Are you aware if nicotine pouches are safe to use in people with underlying medical conditions such as heart diseases, hypertension, and diabetes?	
Yes	441 (25.2)
No	698 (39.9)
Don't know	610 (34.9)
Attitude toward nicotine pouches	
What do you think makes people start using nicotine pouches?	
Stress	344 (19.7)
Depression	311 (17.8)
Peer pressure	196 (11.2)
Acceptability in family	28 (1.6)
Recreational use	152 (8.7)
Quit smoking or e-cigarette	672 (38.4)
Look cool/fun	23 (1.3)
All of the above	15 (0.9)
Don't know	7 (0.4)
How effective do you think nicotine pouches are in helping people quit smoking regular cigarettes?	
Extremely effective	203 (11.6)
slightly effective	1000 (57.2)
no effect at all	366 (20.9)
slightly ineffective	93 (5.3)
extremely ineffective	87 (5.0)
When comparing harmful effects of nicotine pouches to regular cigarettes, how harmful do you think they are?	
Much more harmful	373 (21.3)
Slightly more harmful	174 (9.9)
Equally harmful	464 (26.5)
Slightly less harmful	581 (33.2)
Much less harmful	157 (9.0)

Continued.

Questions	N (%)
When comparing the addiction of nicotine pouches to regular cigarettes, how addictive do you think they are?	
Much more addictive	435 (24.9)
Slightly more addictive	271 (15.5)
Equally addictive	595 (34.0)
Slightly less addictive	385 (22.0)
Much less addictive	63 (3.6)
Do you think using nicotine pouches makes young people “fit in”, feel “cool” and become socially more acceptable?	
Yes	538 (30.8)
No	912 (52.1)
Don't know	299 (17.1)
How easy do you think it is to buy nicotine pouches for young people of your age?	
Very easy	743 (42.5)
Easy	660 (37.7)
Difficult	292 (16.7)
Very difficult	54 (3.1)
If a good friend of yours wanted you to try nicotine pouches, would you try them?	
Definitely will	70 (4.0)
Probably will	275 (15.7)
Probably will not	301 (17.2)
Definitely will not	1103 (63.1)
Would you ever promote or recommend the use of nicotine pouches to other people if you got the chance to?	
Yes	102 (5.8)
No	1475 (84.3)
Don't know	172 (9.8)
Do you think that the use of nicotine pouches should be regulated like other tobacco-products?	
Yes	659 (37.7)
No	868 (49.6)
Don't know	222 (12.7)
Practices regarding nicotine pouches	
Have you ever used nicotine pouches?	
Yes	300 (17.2)
No	1449 (82.8)
If yes, what age	20.3±4.3
Are you a current nicotine pouch user?	
Yes	164 (54.7)
No	136 (45.3)
If yes, how often do you use nicotine pouches?	
Daily	68 (41.5)
2-3 times a week	31 (18.9)
Once a week	31 (18.9)
2-3 times a month	9 (5.5)
Once a month	6 (3.7)
Once every 2-3 months	7 (4.3)
Only tried once	12 (7.3)
If you are a current nicotine pouch user or have ever used nicotine pouches, what made you start using nicotine pouches?	
Just to try	28 (17.1)
Peer pressure	4 (2.4)
Recreational	49 (29.9)
Problems	5 (3.0)
Stress	13 (7.9)
To quit conventional smoking	53 (32.3)
My parents smoke	2 (1.2)

Continued.

Questions	N (%)
My relative encourage me	2 (1.2)
TV/movie advertisement	2 (1.2)
I believe it is a sign of maturity	1 (0.6)
Like the smell and taste	3 (1.8)
I was able to buy as a minor	2 (1.2)
Do you own a nicotine pouches box?	
Yes, I have mine	112 (68.3)
No, I share with someone else	30 (18.3)
No, I borrow it from other people	22 (13.4)
What brand of nicotine pouches do you currently use?	
Velo	150 (91.5)
Cocaine	2 (1.2)
Hot filter	4 (2.4)
Others	8 (0.5)
Do you use regular cigarettes along with nicotine pouches?	
Yes	70 (42.7)
No	94 (57.3)
If yes, how many cigarettes did you smoke when you started using regular cigarettes? Median (IQR)	3 (2.0-6.0)
How many cigarettes do you smoke currently, along with using nicotine pouches? Median (IQR)	3 (2.0-5.0)
Do you think that nicotine pouches have had an impact on your smoking habit?	
Yes, they have decreased my smoking habits	16 (22.9)
No, they had no impact on my smoking habit	46 (65.7)
The change in my smoking habit is not due to nicotine pouches	8 (11.4)
Have you ever thought of quitting the use of nicotine pouches?	
Yes, as soon as possible	54 (32.9)
Yes, but I think I am not ready	30 (18.3)
No, but I plan eventually	74 (45.1)
No, I plan on using these for the rest of my life	6 (3.7)
If you do not use nicotine pouches, why don't you?	
Regular smoke/e-cigarette is cheaper than nicotine pouches	24 (1.7)
Not interested in nicotine pouches	1163 (80.4)
I don't smoke	260 (18.0)

Table 3: Univariate analysis of significant variables with knowledge and attitude scores.

Variables	Adequate knowledge		Odd ratio (95% CI)	P value
	Yes	No		
Age, years	21.0±3.6	20.3±3.5	1.04 (1.02-1.07)	<0.001
Age group				
<20	265 (38.6)	492 (46.3)	1.0	<0.001
20-22	252 (36.7)	416 (39.1)	1.12 (0.90-1.39)	0.28
23-25	116 (16.9)	97 (9.1)	2.22 (1.63-3.02)	<0.001
>25	53 (7.7)	58 (5.5)	1.69 (1.13-2.53)	0.01
Sex				
Female	372 (54.2)	706 (66.4)	1.0	<0.001
Male	314 (45.8)	357 (33.6)	1.66 (1.37-2.03)	
Province				
Punjab	426 (62.1)	601 (56.5)	1.0	0.001
Sindh	153 (22.3)	329 (31)	0.65 (0.52-0.82)	<0.001
Baluchistan	10 (1.5)	11 (1.0)	1.28 (0.54-3.04)	0.57
KPK	90 (13.1)	105 (9.9)	1.20 (0.88-1.64)	0.22
Kashmir	6 (0.9)	9 (0.8)	0.94 (0.33-2.66)	0.90
GB	1 (0.1)	8 (0.8)	0.17 (0.02-1.41)	0.10
Education				

Continued.

Variables	Adequate knowledge		Odd ratio (95% CI)	P value
Schooling	47 (6.9)	73 (6.9)	1.0	<0.001
Inter/A level.	333 (48.5)	667 (62.7)	0.77 (0.52-1.14)	0.20
Bachelor	242 (35.3)	276 (26)	1.36 (0.90-2.04)	0.13
Master and above	64 (9.3)	47 (4.4)	2.11 (1.25-3.57)	0.005
Chief wage earner's monthly income				
>60,000	244 (35.6)	489 (46)	1.0	0.001
30,000-60,000	112 (16.3)	156 (14.7)	1.43 (1.08-1.91)	0.01
22,500-30,000	54 (7.9)	71 (6.7)	1.52 (1.03-2.24)	0.03
15,000-22,5000	53 (7.7)	63 (5.9)	1.68 (1.13-2.50)	0.01
9,000-15,000	48 (7.0)	49 (4.6)	1.96 (1.28-3.0)	0.002
3,000-9,000	48 (7.0)	55 (5.2)	1.74 (1.15-2.65)	0.009
<3,000	127 (18.5)	180 (16.9)	1.41 (1.07-1.86)	0.01
Would you say that you are currently under any kind of stress?				
Yes	332 (48.4)	598 (56.3)	1.0	0.002
No	214 (31.2)	302 (28.4)	1.27 (1.02-1.59)	0.03
Don't know	140 (20.4)	163 (15.3)	1.54 (1.19-2.01)	0.001
Negative attitude				
	Yes	No	Odds ratio (95% CI)	P value
Province				
Punjab	533 (56.3)	494 (61.5)	1.0	0.21
Sindh	284 (30)	198 (24.7)	1.32 (1.06-1.65)	0.01
Baluchistan	13 (1.4)	8 (1.0)	1.50 (0.61-3.66)	0.36
KPK	103 (10.9)	92 (11.5)	1.03 (0.76-1.41)	0.81
Kashmir	8 (0.8)	7 (0.9)	1.05 (0.38-2.94)	0.91
GB	5 (0.5)	4 (0.5)	1.15 (0.30-4.33)	0.82
chief wage earner's monthly income				
>60,000	390 (41.2)	343 (42.7)	1.0	0.21
30,000-60,000	136 (14.4)	132 (16.4)	0.90 (0.68-1.19)	0.49
22,500-30,000	61 (6.4)	64 (8.0)	0.83 (0.57-1.22)	0.36
15,000-22,5000	65 (6.9)	51 (6.4)	1.12 (0.75-1.22)	0.57
9,000-15,000	62 (6.6)	35 (4.4)	1.55 (1.00-2.41)	0.04
3,000-9,000	55 (5.8)	48 (6.0)	1.008 (0.66-1.52)	0.97
<3,000	177 (18.7)	130 (16.2)	1.19 (0.91-1.56)	0.18

Knowledge, attitude and practices related to NPs

The knowledge section had a total of 6 marks and 686 (39.22%) people were considered to have adequate knowledge (scored ≥ 4) regarding NPs. Around 10.0% of people scored zero while 97 (5.54%) people scored the maximum score of 6. The mean score for knowledge of the respondents was 3.001. Most of the respondents knew what NPs through the internet or friends as their sources of information. Most of them knew that this causes addiction and potentially have long term health consequences. However, majority (68.0%) was not aware of the ingredients of NPs, as shown in Table 2.

The attitude section had a total of 8 marks and 879 (50.26%) people had a score of ≥ 5 and were categorized into people having a negative towards NPs i.e. disliking and considering NPs to be as harmful. The mean score for the attitude of the participants was 4.75. Majority of the participants thought that either psychological factors (37.5%) or the urge to quit smoking (38.4) makes people start using NPs and 57.2% people believe NPs might be

slightly effective in assisting cessation of smoking. In contrast to this, 34% of the respondents believe they are equally addictive and 26.5% think they are equally harmful to health when compared to cigarettes. Around 63.0% people admitted they will never try NPs even if a friend offers them and 1475 (84.3%) people say they will never promote or recommend it to anyone, as shown in Table 2.

For practices regarding NPs, 300 (17.2%) participants reported using nicotine products at least once in their life and the mean age at which they tried it was 20.3 (4.3) years. The rest of the respondents who never tried NPs, 80.4% of them were not interested and 1.7% preferred cigarettes. Among the users, 164 (54.7) were current users of NPs and 41.4% of these users were daily users. Most of these users started using NPs either to quit conventional cigarette smoking (n=53, 32.3%) or out of curiosity (n=28, 17.1%) for the new product. Cigarette smoking alongside NPs was also recorded (n=70) and more than half of these individuals described a reduction in smoking habits but statistically no difference observed

in median (IQR) cigarettes used before and after the start of NPs use (median=3, IQR=2-6), as shown in Table 2.

Table 4: Multivariate analysis for factors predicting adequate knowledge.

	Odd ratio (95% CI)	P value
Sex		
Female	1.0	<0.001
Male	1.76 (1.43-2.15)	
Province		
Punjab	1.0	0.01
Sindh	0.71 (0.56-0.90)	0.005
Baluchistan	1.29 (0.53-3.15)	0.57
KPK	1.14 (0.83-1.57)	0.40
Kashmir	0.82 (0.27-2.42)	0.72
GB	0.15 (0.01-1.32)	0.08
Education		
Schooling	1.0	<0.001
Inter/A level	0.83 (0.56-1.24)	0.37
Bachelor	1.38 (0.91-2.10)	0.12
Master and above	2.18 (1.27-3.75)	0.004
Chief wage earner's monthly income		
>60,000	1.0	0.001
30,000-60,000	1.44 (1.07-1.95)	0.01
22,500-30,000	1.42 (0.96-2.12)	0.07
15,000-22,5000	1.64 (1.09-2.47)	0.01
9,000-15,000	2.04 (1.32-3.17)	0.001
3,000-9,000	1.90 (1.24-2.92)	0.003
<3,000	1.47 (1.11-1.96)	0.007

Univariate and multivariate analysis

A univariate analysis was conducted for knowledge and attitude scores with the demographic and medical history variables, as shown in Table 3. Most demographic variables were significant for knowledge scores except marital status and medical history. The people in the age group 23-25 and 20-22 years had 2.22 times and 1.12 times, respectively, more adequate knowledge when compared to people under the age of 20 years. People currently not under any kind of stress had 1.27 times more adequate knowledge regarding NPs when compared to people under stress. For attitude scores only monthly income and province of the respondent were significant variables. Lower income and belonging to Balochistan and KPK was associated with a negative attitude towards NPs.

A multivariate analysis for significant variables in univariate was conducted, as shown in Table 4. Gender ($p<0.001$), province ($p=0.01$), education ($p<0.001$), and monthly income ($p=0.001$) had a significant association with Knowledge scores. Male participants had 1.76 times more adequate knowledge than the females. For province, when compared to Punjab the people living in Sindh had 0.29 times less knowledge regarding NPs. People with a master's degree or above had 2.18 times more adequate

knowledge when compared to school going children. All the categories of monthly income, as shown in Table 3, had significant association with adequate knowledge when compared to people earning more than 60,000 PKR, except for people earning between 22,500-30,000 PKR. For multivariate analysis of attitude scores (Table 5), only province ($p=0.17$) and monthly income were significant ($p=0.18$). People residing in Sindh had 1.34 times more negative attitude towards NPs when compared to people residing in Punjab. People earning between 9000-15,000 PKR had 1.60 times more negative attitude when compared to people earning more than 60,000 PKR.

Table 5: Multivariate analysis for factors predicting negative attitude.

	Odd ratio (95% CI)	P value
Province		
Punjab	1.0	0.17
Sindh	1.34 (1.08-1.68)	0.008
Baluchistan	1.51 (0.61-3.68)	0.36
KPK	1.05 (0.77-1.43)	0.75
Kashmir	1.03 (0.37-2.88)	0.95
GB	1.04 (0.27-3.95)	0.94
chief wage earner's monthly income		
>60,000	1.0	0.18
30,000-60,000	0.91 (0.68-1.20)	0.51
22,500-30,000	0.85 (0.58-1.25)	0.43
15,000-22,5000	1.14 (0.77-1.70)	0.49
9,000-15,000	1.60 (1.03-2.48)	0.03
3,000-9,000	1.01 (0.67-1.53)	0.93
<3,000	1.21 (0.93-1.59)	0.15

DISCUSSION

NPs have recently been launched in the Pakistani market with the introduction of 'Velo' in 2019 and until now there have been very few studies conducted on this product to investigate its harmful effects and the public's opinion and their practices.¹⁶ There is a sudden upsurge in the advertisements and free of cost distribution of NPs in various cities across Pakistan. This trend is similar to the one that was once observed in the early 1900s when cigarettes were being advertised extensively in an attempt to make them socially acceptable. There is little information available about the safety and contents of NPs, and yet they are being endorsed by various influential institutions and social media platforms. The lack of anti-narcotic campaigns has led to a delusional perception among the general population that NPs are safe to use and help in smoking cessation, however, there is no scientific evidence to support this. The current study reported 17.2% prevalence of NPs among the Pakistani population and 54.7% of these users were actively using NPs regularly. This prevalence is higher than the prevalence noted in a previous study from year 2021 on NPs from Pakistan.¹⁷ This shows a rising trend in NP use across the country. This can potentially be explained by the unethical marketing practices; companies are

promoting them as safe; their campaign is unregulated by the government and the national celebrities are promoting this product on social media without checking its safety. Free samples are being provided to youngsters without checking any proof of age to promote the product.^{18,19} Due to such unregulated campaigns, the public is getting the perception that these are safe alternatives when in reality the harmful effects can include gum diseases, cavities, cancers of the oral cavity, and a higher risk of heart disease and stroke.

The mean score of knowledge and attitude towards NPs was 3.001 and 4.75, respectively. Both the scores were lower than the cut offs decided (at least 50% score) for adequate knowledge and negative attitude. This is consistent with previous studies on alternate nicotine delivery systems in Pakistan.²⁰ Low knowledge regarding NPs and the unsolicited notion that these can serve as an alternative to smoking cessation, as is evident by the growing percentage of concurrent smoking and NP use, indicates a high probability for NPs to become a threat to our youth in terms of widespread use of a harmful product. Higher monthly income was found to be associated with a negative attitude towards NPs. The use of NPs has been linked to being 'cool' and has widely been endorsed by celebrities. The main source of awareness regarding NPs are television and social media. Therefore, it is not surprising that the upper class are endorsing the product more given the price range of a nicotine pouch pack ranging from Rs. 600/- to Rs. 1100/-.

NPs brands such as 'Velo' are increasingly available for sale across Pakistan. A study conducted by the Institute for Global Tobacco Control showed that 22% of tobacco vendors across 8 cities of Pakistan had 'Velo' products displayed at their stores and 13% of tobacco vendors had advertisements for 'Velo' posted at their point-of-sale.¹⁷ The Pakistan National Heart Association (PANAHA) strongly appealed the government to curb the increasing addiction of NPs in the youth stating that it contained harmful chemicals that can cause heart ailments, cancer, kidney diseases, or stunted growth.^{21,22} Therefore, it is imperative to take measures to address the rising issue of NPs addiction amongst our youth.

Our study recruited a large sample size and was the first study to assess the use and KAP of NPs at a national level. However, it had some limitations. The sample size is acceptably large but might not be enough to be representative of the entire Pakistani population, including unequal responses from all provinces of the country, the findings require cautious interpretation and generalization. Also, information bias and selection bias cannot be eliminated in a web-based study. Moreover, due to the cross-sectional design of the study, the temporal relationship cannot be studied. However, future research in this area can make use of perspective and longitudinal designs to establish temporal associations. The participants were approached through convenience sampling through online forms and as a result most of the

participants were from the younger age group. As per a survey by Pakistan Telecommunication Authority, around 63% of the 76 million internet users in Pakistan, belong to the ages between 20 and 25 years.²³ The survey also included the educated class with most of the respondents currently in inter/A levels (57.2%); this can potentially overestimate knowledge and attitudes of Pakistan's population.

CONCLUSION

Data from our study shows a 10.0% prevalence of current NP consumption among our youth with below adequate knowledge regarding their ingredients. Furthermore, our study shows contradicts the perception that NPs help in smoking cessation. There is little data available regarding the safety of NPs, and considering the increasing trends of its use, our study highlights the need for country-wide interventions to prevent this trend from becoming an addiction through education and regulated distribution.

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