

Awareness and Perception of Nicotine Pouches and E-Cigarettes among Dental Students in Lahore

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ABSTRACT

Objective: The purpose of this study was therefore, to assess the awareness and perception of dental students regarding these products, which are rapidly being marketed in Pakistan.

Methods: The study was cross-sectional, close-ended questionnaire based and helped the investigators to compare the awareness and perception of dental students regarding nicotine pouches and e-cigarettes. Students in 1st, 2nd, 3rd and final year of nine dental colleges in Lahore city were targeted to fill the questionnaire via convenience sampling and Microsoft Excel was used to analyze the results obtained.

Results: More than 70% of the participants were aware of nicotine pouches and e-cigarettes. However, very few participants had ever used them. Almost 1/3rd of the participants believed that both nicotine pouches and e-cigarettes are less harmful and less addictive than regular cigarettes and can help quit smoking.

Conclusion: Generally, people were better aware of e-cigarettes and considered them less harmful and less addictive compared to NPs while NPs were considered as a better alternative to help quit smoking.

Keywords: Nicotine pouches, E-cigarettes, new nicotine products, awareness, perception

INTRODUCTION

Newer, non-traditional, tobacco-less consumer products such as nicotine pouches and e-cigarettes are rapidly gaining popularity all over the world [1]. These products were first introduced in the early 2000s [2, 3]; since then, their use has risen rapidly as they are "tobacco-free" alternatives to cigarettes. Such products have the potential to either increase or decrease the disease burden caused by smoking [3].

World Health Organization, reported tobacco use as the biggest preventable cause of deaths worldwide, killing more than 8 million people each year, with more than 7 million people dying directly from tobacco use and 1.2 million dying as a result of passive smoking [4].

Tobacco is used in a variety of products, of which cigarette smoking is the most common [5]. Waterpipe tobacco, various smokeless tobacco products, cigars, cigarillos, pipe tobacco, bidis, kreteks, hookah, chuttas, dhumti, chillum, and cheroots are among the other tobacco products available. Oral tobacco products including mishri, gul, gudakhu are used topically on teeth and gums. The most widely used forms of smokeless tobacco in Pakistan are pan, pan-masala or gutka, mishri, and snus or naswar [6].

International Association for Research on Cancer [IARC] reported that, more than 55 compounds present in cigarette smoke are carcinogenic [5, 7]. Tobacco users are also at a high risk of developing lung cancer, oral cancer, heart disease, and blood clots. Smokeless tobacco use is highly addictive and detrimental to health as it contains many cancer-causing toxins and increases the risk of head,

neck, and oral cavity malignancies as well as several dental disorders [8].

Tobacco prevalence is affected by a multitude of psychosocial, economic, cultural and vocational factors. Overall, America and Western European countries tend to have lower smoking rates, while the highest smoking rates are found in Southeast Asia and the Southeastern parts of Europe. Pakistan is ranked 68th out of 127 countries in terms of smoking rates, with almost 1/4th of the population smoking [9]. According to the WHO's Non-communicable Diseases [NCD] Risk Factors Survey in Pakistan in 2014, 1/10th of the population was current tobacco smokers, with men accounting for the majority. Almost 7 in 100 were current users of smokeless tobacco. In general, smoking rates have fallen globally due to increased awareness on the harms of tobacco use and anti-tobacco initiatives [5].

Nicotine replacement therapies [NRTs] have been shown to increase smoking cessation rates compared with placebo [1]. Their use is based on the strategy of harm reduction, a technique of providing smokers with less hazardous alternatives to combustible tobacco, in an effort to hasten the reduction in smoking prevalence and minimize smoking-related disease and death. Even though nicotine contributes to addiction, it is not listed as a carcinogen by the International Agency for Research on Cancer [IARC]. Therefore, the tobacco industry has been exploring alternative, supposedly "lower risk" oral nicotine delivery methods, compared with traditional cigarettes. Among such newer products are Nicotine pouches and E-cigarettes, which are gaining popularity all over the world, and may be the future of conventional smoking cessation [10, 11].

Nicotine pouches are modern, oral, tobacco-free products that come in the form of pre-portioned pouches marketed as smoke free alternatives to cigarette smoking. They contain plant derived or synthetically produced, high purity nicotine, and are similar to snus except that they do not contain tobacco and have a lower toxicant profile. These are distributed and marketed nowadays in Pakistan under the brand name 'Velo'. Nicotine pouches are available in varying strengths and are promoted as smoke free, hands free, stain-free products that can be used anytime, anywhere [10, 12].

On the contrary, nicotine, in addition to being highly addictive, is widely recognized to produce major systemic adverse effects. It also leads to chemotherapeutic drug resistance. Some researchers have also found nicotine to be tumorigenic and carcinogenic, however, it is not listed as a carcinogen by the International Agency for Research on Cancer [IARC] [13]. While regulatory and healthcare agencies believe that nicotine is mostly innocuous at the amount of exposure via tobacco products, it is harmful in high levels [13]. The researchers looked at the emissions of 20 of the Harmful and Potentially Harmful Compounds [HPHCs] for which data was available for traditional cigarettes and nicotine pouches. Notably, while 18 of the 20 tested chemicals were quantifiable in cigarette smoke, only 3 of the 20 HPHCs were quantifiable in Nicotine Pouches [11]. Therefore, the sale of nicotine products needs to be strictly regulated.

Electronic Nicotine Delivery Systems [ENDS], often known as e-cigarettes, are battery-operated portable devices that provide nicotine by the inhalation of a vaporised, flavoured liquid [14]. E-cigarettes have been touted as quitting aids by their producers since studies have indicated that they contain fewer quantities of toxicants than combustible cigarettes, hence they pose a lesser health risk [15]. The Food and Drug Administration [FDA] attempted to restrict the sale and promotion of e-cigarettes, but the measure was overturned by a federal court [15].

On the other hand, numerous toxicants and carcinogens have been found in e-cigarette solutions which include polycyclic aromatic hydrocarbons as well as nicotine, and volatile organic compounds. E-cigarette exposure has also proven to be cytotoxic to human embryonic stem cells. Nicotine is the main psychoactive ingredient in e-cigarette liquid. There is limited evidence that e-cigarettes can help people quit smoking, according to the National Academies of Sciences, Engineering, and Medicine [15].

Alternatives to smoking, such as nicotine pouches and e-cigarettes, are rapidly gaining popularity around the world, and they may be the future of traditional smoking cessation. According to a new study, despite the fact that global e-cigarette awareness and consumption has increased tremendously in recent years, they are still underused in developing countries [14]. There is currently no research in Pakistan about the awareness and perception of NPs since it is a very new product launched in December 2019, therefore it was crucial to explore this avenue.

The aim of the current study is to estimate the awareness and use of NPs and e-cigarettes among dental

students in Lahore, and to explore the perceived harmful effects of these products compared to traditional cigarettes. This will enable us to better understand the attitude of youth towards these newer products.

MATERIAL AND METHODS

A cross-sectional, questionnaire based study was conducted over a duration of three months after the approval of synopsis among the 1st, 2nd, 3rd, and final year dental students of nine different medical colleges in Lahore city. A sample size of 317 was determined with the help of Krejcie and Morgan table and a final population size of 340 students was obtained via convenience sampling. Students currently enrolled in 1st, 2nd, 3rd, or final year BDS, aged 18 or above were only included in this study. Those individuals who refused to give consent were excluded from the study. Data was collected through an online close-ended questionnaire consisting of 3 sections which included demographic characteristics regarding age, gender, institute, year of study, residential status, and smoking status. The second section dealt with the awareness and usage of NPs and e-cigarettes. The last section dealt with the perception of students regarding the effects of NPs and e-cigarettes. This questionnaire was forwarded to class groups online and maximum number of students were approached personally to fill the questionnaire. Data was entered into Microsoft excel sheet and results were calculated in the form of percentages.

Ethical approval was granted by the Ethical Review Committee, CMH Lahore Medical College and Institute of Dentistry.

RESULTS

Gender, age, year of study, residential status, smoking status, and frequency of smoking were taken as demographic variables. Among a total of 339 participants, 113 participants were male and 226 were female. Out of these, 126 (62.8%) were day scholars while 213 (37.2%) were hostelites. Moreover, 34.8% of the participants were from 1st year, 17.7% from 2nd year, 18.9% from 3rd year and 28.6% participants were from final year BDS.

Table 1: Demographical information

		Frequency	Percent
Gender	Male	113	33.3%
	Female	226	66.7%
Year of Study	1st year	118	34.8%
	2nd Year	60	17.7%
	3rd year	64	18.9%
	4th year	97	28.6%
Residential status	Day Scholars	213	62.8%
	Hostelite	126	37.2%
Smoking Status	Regular Smoker	13	3.8%
	Occasional/ Social smoker	30	8.9%
	Non-Smoker	296	87.3%
Frequency of Smoking	1-5	19	5.6%
	6-10	6	1.8%
	11-15	1	0.3%
	more than 20	2	0.6%
	N/A- I don't Smoke	311	91.7%

The percentage of smokers in our data was 12.7% out of which, only 3.8% were regular smokers and 8.9% were occasional smokers. Among smokers, majority of participants smoked 1 to 5 cigarettes per day.

38.9% participants reported that they have family members who are smokers, while 28.9% of participants have close friends who are smokers. 43.1% of participants reported that their colleagues whom they closely interact with are smokers.

More than 70% of the participants were aware of nicotine pouches and e-cigarettes. However, usage of nicotine pouches was reported by only 7.4%, whereas usage of e-cigarettes was reported by 22.1% of the participants.

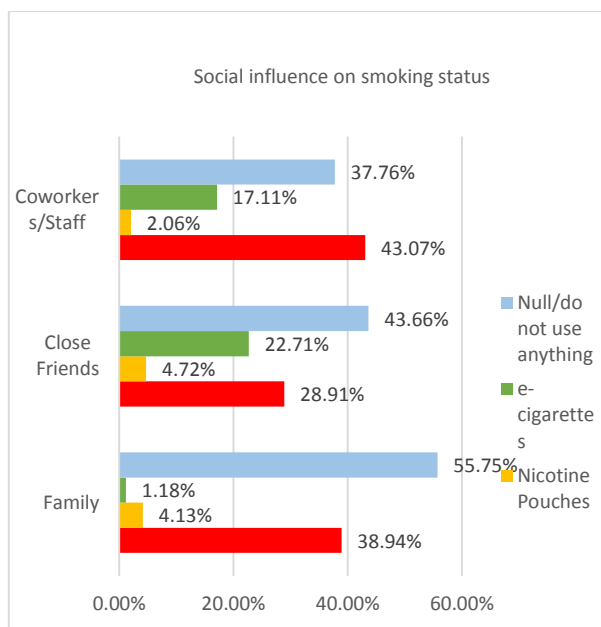


Figure 1: Social influence on smoking status

Table 3: Perception about E-cigarettes

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
E-cigarettes are less harmful than cigarettes	11.21%	26.55%	30.09%	17.40%	14.75%
E-cigarettes are less addictive than cigarettes	8.26%	18.29%	34.81%	20.65%	17.99%
E-cigarettes can help quit smoking	13.27%	18.58%	32.74%	17.70%	17.70%

Almost 60% of the participants believed that e-cigarettes, while around half of the participants thought that nicotine pouches can lead to the development of COPD. (Graph 3, Graph 4)

Majority of the participants thought that nicotine pouches (69.6%) and e-cigarettes (62.2%), can alter taste and smell acuity. (Graph 3, Graph 4)

Similarly, more number of participants were of the view that nicotine pouches, while less number of participants believed that e-cigarettes can cause halitosis. (Graph 3, Graph 4)

Almost 2/3rd of the participants thought that both nicotine pouches and e-cigarettes have a role in causing teeth staining. (Graph 3, Graph 4)

Almost 2/3rd of the participants believed that nicotine pouches, while nearly half of the participants believed that

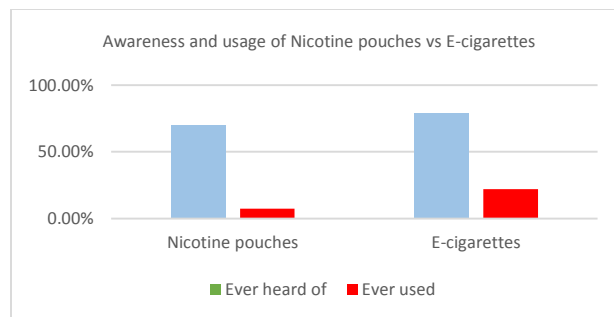


Figure 2: Awareness and usage of Nicotine pouches vs E-Cigarettes

Almost 1/3rd of the participants believed that both nicotine pouches and e-cigarettes are less harmful than regular cigarettes and can help quit smoking, while almost 1/4th of the participants thought that both nicotine pouches and e-cigarettes are less addictive than regular cigarettes. (Table 2, Table 3)

Table 2: Perception about Nicotine pouches

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Nicotine pouches are less harmful than cigarettes	14.70%	21.80%	35.40%	12.70%	15.30%
Nicotine pouches are less addictive than cigarettes	6.80%	16.80%	36.00%	21.50%	18.90%
Nicotine pouches can help quit smoking	11.20%	25.10%	31.60%	18.30%	13.90%

e-cigarettes can contribute to dental caries. (Graph 3, Graph 4)

Nearly 70% participants were of the opinion that nicotine pouches, while 60% thought that e-cigarettes can cause gum disease. (Graph 3, Graph 4)

More than 62% of the participants were of the view that both nicotine pouches and e-cigarettes have a major role in causing oral cancer. (Graph 3, Graph 4)

60% of the participants believed that e-cigarettes, while half of the participants believed that nicotine pouches have a role in the development of lung cancer. (Graph 3, Graph 4)

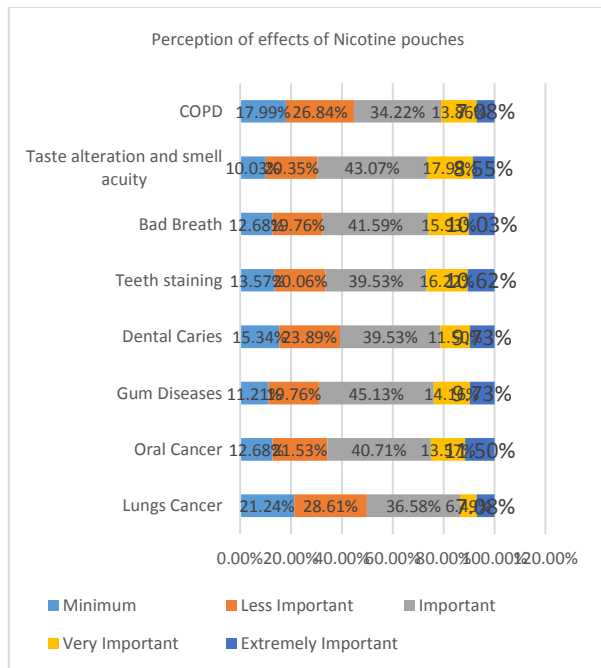


Figure 3: Perception of effects of Nicotine pouches

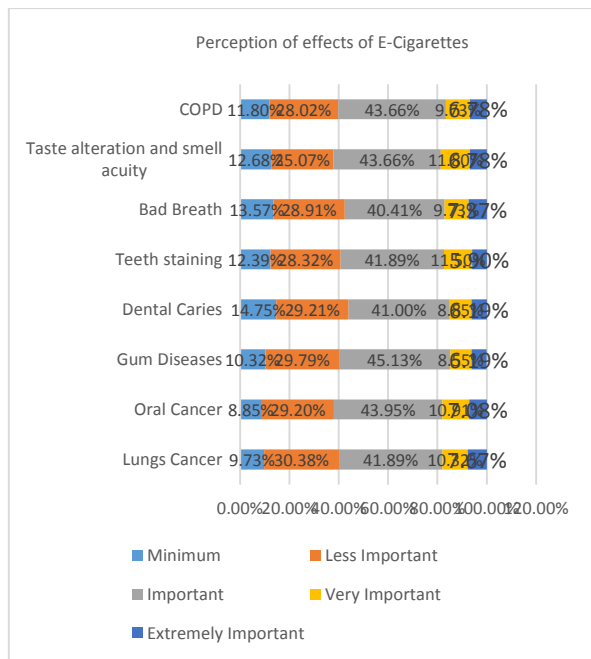


Figure 4: Perception of effects of e-cigarettes

DISCUSSION

Newer, non-traditional, tobacco-less consumer products such as NPs and e- cigarettes have rapidly gained popularity all over the world. Even though their awareness and usage globally has been rising exponentially over the past few years [17], they still remain underused in developing countries. The aim of the current study was to assess the awareness and perception of nicotine pouches and e-cigarettes among dental students in Lahore.

Researches conducted in countries all over the world e.g. US, Korea, Netherlands, Australia, Malaysia, Brazil, China, Hong Kong, Egypt [15,18,19] concluded that almost 2/3rd of the population had heard about e-cigarettes while a very small proportion had ever used them. Limited data was available worldwide regarding awareness and use of NPs, as it is a new product in the international market, however, some studies e.g. those conducted in Netherlands [20] and UK [21] revealed that a very small number of respondents were aware of them and an even smaller number had ever used them. Similar results were obtained in a study conducted in Karachi, Pakistan regarding the awareness and usage of e-cigarettes. [13] The results of our study were congruent with results of previous studies and revealed that a high proportion of the respondents had heard about nicotine pouches and e-cigarettes. Among these, only 7.4% reported having ever used nicotine pouches whereas a much larger number i.e. 22.1% reported that they had used e-cigarettes.

Given that the targeted audience was primarily well-educated and knowledgeable individuals, it is not unexpected that more than three-quarters of the population size in this study had awareness of e-cigarettes. It is, however, surprising that the awareness of nicotine pouches was nearly 70%, given that this product was recently introduced in Pakistan in December 2019. Marketing strategies by companies through social media might have greatly influenced the awareness of the respondents. Frequent usage of technology and ease of web access, especially among younger people, can be ascribed to the high levels of awareness of these products [19]. Moreover, these can have worrisome implications such as the desire for experimentation, which may also lead to initiation of tobacco use and nicotine addiction. Globally, NPs and e-cigarettes being newer products with limited availability and relatively high cost can be blamed for their low levels of use. Fear of the unknown and apprehension about trying new products are also factors contributing to their low usage. Contrarily, traditional cigarettes have been widely available at reasonable costs since many generations [13].

As previous studies suggest [20, 22], social influence has a considerable impact on smoking and the awareness and use of nicotine-containing products. In this study, besides family and co-workers, close friends had the largest influence on the individuals' use of nicotine pouches (4.72%) and e-cigarettes (22.71%). A favorable social environment for nicotine-containing products in which friends and/or family not only use these products but also have positive view about them, is most frequently linked to increased susceptibility to their use [22].

In view of past researches [10, 23], it is reasonable to conclude that NPs and e-cigarettes cause less harm than regular cigarettes. Almost a third of the population in our study regarded them as less harmful than traditional cigarettes and useful alternatives to help quit smoking. Better awareness and better marketing have led to these beliefs. These results are congruent with other studies which suggest that since these products contain synthetically manufactured nicotine derived from natural sources rather than the raw or processed tobacco in cigarettes, their toxicant profile is low [10, 23]. Furthermore, unlike tobacco, these products do not undergo the

combustion of hydrocarbons that results in the emission of carcinogens [10, 23, 24, 25]. Almost 1/4th of the participants thought that both nicotine pouches and e-cigarettes are less addictive than regular cigarettes, with e-cigarettes being the least addictive. Consistent with the literature [26, 27, 28], NPs do not always deliver a lesser amount of nicotine than combustible cigarettes, hence their dependence potential is similar to/higher than that of conventional cigarettes. Regarding e-cigarettes, although some pharmacokinetic data suggests that maximum nicotine level does not exceed conventional cigarettes [29], some studies claim that their ability to deliver comparable or higher amounts of nicotine compared to tobacco cigarette raises concerns about e-cigarette use causing nicotine addiction in young individuals [30]. As a result, the products' safety and long-term risks have yet to be fully proven due to limited data availability regarding their positive and detrimental effects.

Numerous researches on NRTs have proven many of nicotine's oral and systemic side effects [31], but due to a lack of past research, it is hard to say which product, nicotine pouch or e-cigarette, contributes more. Participants in our survey generally believed that NPs, as opposed to E-cigarettes had a greater impact on the development of oral cancer, alteration of taste and smell acuity, halitosis, teeth staining, dental caries and gum disease. Consistent with literature [32, 33], E-cigarettes were thought to contribute more to COPD and lung cancer.

To the best of our knowledge, no other study of this kind has been conducted in Pakistan before. One of the limitations of this study was low prevalence of use of the two products. Majority of participants in the study were females, as a general trend observed in medical colleges of Pakistan, however the number of female smokers was insignificant, possibly due to cultural reasons in Pakistan resulting in lesser number of women smoking.

CONCLUSION

The frequency of NP and e-cigarette usage was low despite higher than expected awareness. Additionally, participants were better aware of e-cigarettes and considered them less harmful and less addictive compared to NPs while NPs were considered as a better alternative to help quit smoking. However, the long-term health risks of NPs and e-cigarettes are yet to be understood. We therefore suggest that further studies be carried out on these products to better understand their safety profile.

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