ABSTRACT

Background: Despite the popularity of shisha smoking and electronic cigarette smoking practices among Arab and Middle East countries, the knowledge and awareness of the deleterious effects of these habits have never been investigated among the Saudi population.

Objective: This study aimed to assess and compare the knowledge and awareness of the effects of Shisha and electronic cigarette smoking on the oral health of Saudi dental patients.

Subjects and Methods: This observational, cross-sectional study was conducted among 200 dental patients attending university dental clinics in Riyadh, Saudi Arabia. A self-administered, survey-based questionnaire with questions on the effects of Shisha, electronic cigarettes, and dual smoking on oral health was distributed among smokers and non-smokers. Statistical analysis was performed using descriptive statistics and Chi-square tests. Statistical significance was determined at p<0.05.

Results: A total of 200 participants responded to a cross-sectional study conducted between January 2020 and July 2020. Majority of the participants were males (n=129, 64.5%) than females (n=71, 35.5%). There were 22 (11%) non-smokers, 85 (42.5%) shisha smokers, 59 (29.5%) electronic cigarette smokers, and 34 (17%) dual smokers (Shisha and electronic cigarette). The majority (n=151, 75.5%) of the participants were higher educated with post-graduation and graduation degrees. Shisha (n=57, 67.1%) and dual smokers (67.6%) were aware that smoking causes oral cancer. However, 44% of Electronic cigarette smokers disagreed. The detrimental health effects reported by the participants were cancer and white-coated tongue. The majority (64.7%) of the dual smokers shared smoking with families and friends.

Conclusion: In this study, non-smokers and smokers with higher education, showed more knowledge and awareness of the deleterious effects of smoking on oral health than the lower educated dental patients.

Key words: Shisha, Electronic cigarettes, Knowledge, Awareness, Oral health, Saudi Arabia.
popularity and prevalence of Shisha and electronic cigarette smoking among the Saudi population is vital for developing prevention policies and strategies. Therefore, the present study is aimed to assess the level of knowledge and awareness of the effects of Shisha and electronic cigarette smoking on oral health among the Saudi population.

Materials and Methods

Study Design and Sampling
This cross-sectional study was conducted between January 2020 and July 2020 in a sample of dental patients. Researchers distributed a self-administered, close-ended structured questionnaire written in both English and Arabic languages to the 200 dental patients seeking care at Namuthajiya dental clinics of Riyadh Elm University, Riyadh city, Kingdom of Saudi Arabia. Both male and female patients aged between 20-40 years were invited to participate in this study.

A pilot study was conducted to test the validity and feasibility of the study. The content authenticity of the questionnaire was checked on a sample of 25 dental patients to assess the practicability, cogency, and rendition of the answers. The face validity of the questionnaire was established by taking opinions from oral pathologists and dental public health experts. Cronbach's coefficient was found to be 0.80, indicating adequate internal consistency of the study instrument. The questionnaire consisted of 19 items divided into three sections. The first section included questions on demographic details such as age, gender, marital status, education level, and occupation level. The second section contained statements on the practice of smoking. The third section included questions based on knowledge and awareness of the effects of smoking on oral health. Subjects who participated in the pilot study were excluded from the main study.

Inclusion and Exclusion Criteria
Study participants who had smoked Shisha or water pipe and electronic cigarettes at least once daily for one year were categorized as Shisha, and ECIG smokers and dual smokers, respectively, are included. The users of smokeless tobacco products, medically compromised patients with systemic illness, such as diabetes, hypertension, cardiovascular and pulmonary diseases and those undergoing cancer therapy, wearers of partial and/or complete dentures and patients aged above 40 years, toothbrush users, implant wearers, orthodontic appliances wearers were excluded from the study.

Statistical Analysis
Data analysis was conducted using IBM SPSS Statistics version 23.0 (IBM Inc., Chicago, IL, USA). Descriptive statistics (frequencies & percentage) were calculated, and the association between categories was assessed using the Chi-square test. Statistical significance was determined at p-value <0.05.

Ethical Consideration
The participants were instructed on the purpose of the study and informed written consent was obtained. The Institutional Review Board of Riyadh Elm University, IRB approval number "FUGRP/2020/153/101/132," was obtained.

Results
A total of 225 participants initially agreed to take part in the study. However, 25 did not complete the questionnaire due to time constraints and were dropped from the final data analysis. The response rate was 88.8%. A total of 200 participants were finalized in the study.

From among the 200 participants, most of them were males (n=129, 64.5%) than females (n=71, 35.5%), aged between 20-40 years. The majority (n=151, 75.5%) of the participants were higher educated, with post-graduation and graduation degrees, whereas lower educated participants had primary and high school degrees (n=49, 24.5%). About 60% of the participants had jobs, and only 40% were unemployed. The demographic details of the participants are shown in Table 1.

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Characteristics</th>
<th>N</th>
<th>N%</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-25 Years</td>
<td></td>
<td>70</td>
<td>35.0</td>
</tr>
<tr>
<td>26-30 Years</td>
<td></td>
<td>47</td>
<td>23.5</td>
</tr>
<tr>
<td>31-35 Years</td>
<td></td>
<td>26</td>
<td>13.0</td>
</tr>
<tr>
<td>36-40 Years</td>
<td></td>
<td>57</td>
<td>28.5</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td></td>
<td>129</td>
<td>64.5</td>
</tr>
<tr>
<td>Female</td>
<td></td>
<td>71</td>
<td>35.5</td>
</tr>
<tr>
<td>Marital Status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td></td>
<td>101</td>
<td>50.5</td>
</tr>
<tr>
<td>Married</td>
<td></td>
<td>92</td>
<td>46.0</td>
</tr>
<tr>
<td>Divorced/ Widow</td>
<td></td>
<td>7</td>
<td>3.5</td>
</tr>
</tbody>
</table>
The Education Level of Participants and Smoking Status

Overall, the majority (n=151, 75.5%) of the participants were higher educated with post-graduation and graduation levels. Among 178 smokers, 73.02% were higher educated, 35.39% were shisha smokers, 23.59% were ECIG smokers, and 14.04% were dual smokers. Among a total of 22 non-smokers, 95.45% had higher education.

Among a total of 151 higher educated smokers, the majority were shisha smokers (n=63) than ECIGs (n=42), and dual smokers (n=25), and the prevalence of shisha smoking among higher educated (graduation and post-graduation) participants was reported higher (41.72%) compared to ECIG (27.8%) and dual smoking (16%). The lower educated participants (primary and high school) showed a high prevalence of ECIG smoking (Table 2).

The Smoking Habit among Study Subjects

Duration of smoking for the majority (n=90, 50.5%) was from 1-2 years, for 20-30 minutes once a day, aged between 20-25 years (p < 0.001). About 46% of smokers consumed alone. For the statement "Do you share smoking with friends and family members," the response "No" was the highest, which was about 52.8% (n=94) than "Yes" (n=84, 47.1%). However, the majority (64.7%) of the dual smokers shared...
smoking with families and friends. The reason for smoking was curiosity and to reduce stress. There was a significant difference between smokers of Shisha, ECIGs, and dual smokers regarding the responses (P< 0.001). Most of (60.8%) of the smokers were interested in quitting smoking, whereas only 39.2% were not willing. About 85.3% were aware of tobacco cessation centers (Table 3).

<table>
<thead>
<tr>
<th>Practice</th>
<th>Responses</th>
<th>SHISHA</th>
<th>ECIGs</th>
<th>Dual smokers</th>
<th>χ²</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. At what age you initiated smoking? (in years)</td>
<td>10-20</td>
<td>17 20.0</td>
<td>14 23.7</td>
<td>11 32.4</td>
<td>200.570</td>
<td>&lt;0.001**</td>
</tr>
<tr>
<td></td>
<td>20-25</td>
<td>42 49.4</td>
<td>33 55.9</td>
<td>17 50.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>26-30</td>
<td>16 18.8</td>
<td>11 18.6</td>
<td>2 5.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>31-35</td>
<td>10 11.8</td>
<td>1 1.7</td>
<td>4 11.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Duration of smoking habit (in years)</td>
<td>1-2</td>
<td>47 55.3</td>
<td>31 52.5</td>
<td>12 35.3</td>
<td>211.945</td>
<td>&lt;0.001**</td>
</tr>
<tr>
<td></td>
<td>3-4</td>
<td>14 16.5</td>
<td>21 35.6</td>
<td>14 41.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4-5</td>
<td>0 0.0</td>
<td>1 1.7</td>
<td>0 0.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5-6</td>
<td>16 18.8</td>
<td>6 10.2</td>
<td>4 11.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt;10</td>
<td>8 9.4</td>
<td>0 0.0</td>
<td>4 11.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Daily frequency of smoking?</td>
<td>Once</td>
<td>44 51.8</td>
<td>10 16.9</td>
<td>8 23.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Twice</td>
<td>19 22.4</td>
<td>9 15.3</td>
<td>5 14.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Thrice</td>
<td>14 16.5</td>
<td>11 18.6</td>
<td>5 14.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Four times</td>
<td>2 2.4</td>
<td>7 11.9</td>
<td>7 20.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Five or more</td>
<td>6 7.1</td>
<td>22 37.3</td>
<td>9 26.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Duration of a smoking in a day?</td>
<td>20-30 min</td>
<td>46 54.1</td>
<td>35 59.3</td>
<td>20 58.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>30-40 min</td>
<td>12 14.1</td>
<td>5 8.5</td>
<td>4 11.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>40-50 min</td>
<td>9 10.6</td>
<td>2 3.4</td>
<td>1 2.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1-2 hours</td>
<td>15 17.6</td>
<td>13 22.0</td>
<td>7 20.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 2 hours</td>
<td>3 3.5</td>
<td>4 6.8</td>
<td>2 5.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Share your smoking with others such as friends and family members?</td>
<td>Yes</td>
<td>34 40.0</td>
<td>28 47.5</td>
<td>22 64.7</td>
<td>23.99</td>
<td>&lt;0.001**</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>51 60.0</td>
<td>31 52.5</td>
<td>12 35.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Why do you smoke?</td>
<td>Decrease stress</td>
<td>24 28.2</td>
<td>20 33.9</td>
<td>8 23.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Friends influence</td>
<td>17 20.0</td>
<td>9 15.3</td>
<td>10 29.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Curiosity</td>
<td>39 45.9</td>
<td>26 44.1</td>
<td>14 41.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pleasure</td>
<td>0 0.0</td>
<td>1 1.7</td>
<td>1 2.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Family Influence</td>
<td>5 5.9</td>
<td>3 5.1</td>
<td>1 2.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. With whom do you share smoking?</td>
<td>Alone</td>
<td>38 44.7</td>
<td>34 57.6</td>
<td>10 29.4</td>
<td>188.278</td>
<td>&lt;0.001**</td>
</tr>
<tr>
<td></td>
<td>Friends</td>
<td>33 38.8</td>
<td>17 28.8</td>
<td>18 52.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Family</td>
<td>14 16.5</td>
<td>8 13.6</td>
<td>6 17.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Do you know that there are tobacco smoking habit cessation centers?</td>
<td>Yes</td>
<td>74 87.1</td>
<td>49 83.1</td>
<td>29 85.3</td>
<td>0.635</td>
<td>0.888 NS</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>11 12.9</td>
<td>10 16.9</td>
<td>5 14.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Do you like to quit/stop smoking habit?</td>
<td>Yes</td>
<td>54 63.5</td>
<td>39 66.1</td>
<td>15 44.1</td>
<td>1.395</td>
<td>0.707 NS</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>31 36.5</td>
<td>20 33.9</td>
<td>19 55.9</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3: Smoking Habits Related to Variables among Study Participants

** Highly significant (p<0.001), *- Significant (p<0.05), NS- Non-significant (p>0.05)
Assessment of Knowledge on the Effects of Smoking on Oral Health

There were five questions related to knowledge and five related to awareness in the questionnaire. The response to the statement "Do you know the bad effects of smoking on oral health?" was "Yes" among 68.2% of the non-smokers and 62.3% of smokers, whereas 41.5% of smokers were not aware. Non-smokers (n=21, 95.5%) had more knowledge than smokers (n=113, 63.4%) about the statement that smoking causes oral cancer.

The majority of Shisha (n=57, 67.1%) and dual smokers (67.6%) agreed that smoking causes oral cancer. However, 44% of ECIG smokers disagreed with it (P=0.010). Smoking causes bad breath was known to 86.4% of non-smokers, and 76.4% of smokers; mostly, Shisha smokers (n=73, 85.9%) were aware that smoking causes bad breath (P= 0.001). The statement that "smoking causes infectious diseases such as Tuberculosis, herpes ulcers and hepatitis C on sharing with others" was agreed by 91(51.1%) of smokers and 15 (68.2%) of non-smokers, whereas 48.8% of smokers disagreed with it. (Table 4).

### Table 4. Assessment of the Knowledge on the Effects of Smoking on Oral Health among Smokers and Non-smokers

<table>
<thead>
<tr>
<th>Knowledge</th>
<th>SHISHA</th>
<th>ECIGs</th>
<th>Dual smokers</th>
<th>Non- Smoker</th>
<th>χ²</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>10. Do you know the bad effects of smoking on oral health?</td>
<td>Responses</td>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
<td>N</td>
</tr>
<tr>
<td>Yes</td>
<td>56</td>
<td>65.9</td>
<td>36</td>
<td>61.0</td>
<td>19</td>
<td>55.9</td>
</tr>
<tr>
<td>No</td>
<td>29</td>
<td>34.1</td>
<td>23</td>
<td>39.0</td>
<td>15</td>
<td>44.1</td>
</tr>
<tr>
<td>Total</td>
<td>85</td>
<td>100</td>
<td>59</td>
<td>100.0</td>
<td>34</td>
<td>100</td>
</tr>
</tbody>
</table>

| 11. Do you know smoking causes oral cancer? | Responses | N | % | N | % | N | % | N | % | χ² | P |
| Yes | 57 | 67.1 | 33 | 55.9 | 23 | 67.6 | 21 | 95.5 | 11.3 | 0.010 | * |
| No | 28 | 32.9 | 26 | 44.1 | 11 | 32.4 | 1 | 42.4 | 11.3 | 0.010 | * |
| Total | 85 | 100 | 59 | 100.0 | 34 | 100 | 22 | 100.0 | 11.3 | 0.010 | * |

| 12. Do you know that sharing of smoking causes infectious diseases like tuberculosis (TB), herpes ulcers and hepatitis C? | Responses | N | % | N | % | N | % | N | % | χ² | P |
| Yes | 42 | 49.4 | 33 | 55.9 | 16 | 47.1 | 15 | 68.2 | 3.16 | 0.036 | NS |
| No | 43 | 50.6 | 26 | 44.1 | 18 | 52.9 | 7 | 31.8 | 3.16 | 0.036 | NS |
| Total | 85 | 100 | 59 | 100.0 | 34 | 100 | 22 | 100.0 | 3.16 | 0.036 | NS |

| 13. Does smoking causes dry mouth? | Responses | N | % | N | % | N | % | N | % | χ² | P |
| Yes | 49 | 57.6 | 40 | 67.8 | 25 | 73.5 | 18 | 81.8 | 6.04 | 0.011 | NS |
| No | 36 | 42.4 | 19 | 32.2 | 9 | 26.5 | 4 | 18.2 | 6.04 | 0.011 | NS |
| Total | 85 | 100 | 59 | 100.0 | 34 | 100 | 22 | 100.0 | 6.04 | 0.011 | NS |

| 14. Does smoking causes bad breathe in mouth? | Responses | N | % | N | % | N | % | N | % | χ² | P |
| Yes | 73 | 85.9 | 35 | 59.3 | 28 | 82.4 | 19 | 86.4 | 16.0 | 0.001 | * |
| No | 12 | 14.1 | 24 | 40.7 | 6 | 17.6 | 3 | 13.6 | 16.0 | 0.001 | * |
| Total | 85 | 100 | 59 | 100.0 | 34 | 100 | 22 | 100.0 | 16.0 | 0.001 | * |

**Table 4. Assessment of the Knowledge on the Effects of Smoking on Oral Health among Smokers and Non-smokers**

* ** Highly significant (p<0.001), * Significant (p<0.05), NS- Non-significant (p>0.05)
Table 5. Assessment of the Awareness of the Effects of Smoking on Oral Health

<table>
<thead>
<tr>
<th>Awareness</th>
<th>Responses</th>
<th>SHISHA</th>
<th>ECIG</th>
<th>Both</th>
<th>Non-Smoker</th>
<th>χ²</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>15. Are you aware that smoking causes caries?</td>
<td>Yes</td>
<td>66</td>
<td>77.6</td>
<td>38</td>
<td>64.4</td>
<td>22</td>
<td>64.7</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>19</td>
<td>22.4</td>
<td>21</td>
<td>35.6</td>
<td>12</td>
<td>35.3</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>85</td>
<td>100.0</td>
<td>59</td>
<td>100.0</td>
<td>34</td>
<td>100.0</td>
</tr>
<tr>
<td>16. Are you aware that smoking causes stains on teeth?</td>
<td>Yes</td>
<td>20</td>
<td>23.5</td>
<td>51</td>
<td>86.4</td>
<td>32</td>
<td>94.1</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>65</td>
<td>76.5</td>
<td>8</td>
<td>13.6</td>
<td>2</td>
<td>5.9</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>85</td>
<td>100.0</td>
<td>59</td>
<td>100.0</td>
<td>34</td>
<td>100.0</td>
</tr>
<tr>
<td>17. Are you aware that smoking causes the mobility of teeth?</td>
<td>Yes</td>
<td>50</td>
<td>58.8</td>
<td>29</td>
<td>42.2</td>
<td>21</td>
<td>61.8</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>35</td>
<td>41.2</td>
<td>30</td>
<td>50.8</td>
<td>13</td>
<td>38.2</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>85</td>
<td>100.0</td>
<td>59</td>
<td>100.0</td>
<td>34</td>
<td>100.0</td>
</tr>
<tr>
<td>18. Are you aware that smoking causes gum bleeding?</td>
<td>Yes</td>
<td>33</td>
<td>38.8</td>
<td>26</td>
<td>44.1</td>
<td>16</td>
<td>47.1</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>52</td>
<td>61.2</td>
<td>33</td>
<td>55.9</td>
<td>18</td>
<td>52.9</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>85</td>
<td>100.0</td>
<td>59</td>
<td>100.0</td>
<td>34</td>
<td>100.0</td>
</tr>
<tr>
<td>19. Are you aware that smoking causes white coated tongue?</td>
<td>Yes</td>
<td>20</td>
<td>23.5</td>
<td>51</td>
<td>86.4</td>
<td>32</td>
<td>94.1</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>65</td>
<td>76.5</td>
<td>8</td>
<td>13.6</td>
<td>2</td>
<td>5.9</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>85</td>
<td>100.0</td>
<td>59</td>
<td>100.0</td>
<td>34</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Study participants with graduate and postgraduate education had higher knowledge and awareness of the effects of smoking on oral health. The various educational categories of the study participants have shown a significant association with the knowledge of harmful effects of smoking on oral health (p<0.001), smoking as cause of oral cancer (p<0.001), dry mouth (p<0.001), bad smell / bad breath (p<0.001) and infectious diseases like tuberculosis (TB), herpes ulcers and hepatitis C (p<0.001). Similarly educational level showed significant difference in awareness of smoking causes caries (p<0.001), mobility of teeth (p<0.001), and gum bleeding (p<0.001). However, educational categories did not show any significant difference in awareness of smoking causes stains on teeth (p=0.304) and coated tongue (p=0.366), as shown in table 6.
Discussion

This study examined the understanding and comprehension of the consequences of smoking Shisha and ECIGs on oral health among smokers (178) and non-smokers (22), recruited from the dental hospital in Riyadh, Saudi Arabia.

Shisha smoking is on the rise among youth worldwide. It is a common practice in Arabic countries as well as some Asian ones. Although common throughout all age groups, it is particularly popular among teenagers. It often occurs among friends in social settings such as private residences or venues that offer ready-to-smoke Shisha to customers. Shisha smoking is a threat to both oral and general health of the public. It has been associated with adverse oral health outcomes.\(^\text{11, 12}\)

Several cross-sectional studies conducted in India had reported the association of Shisha smoking with several oral lesions.\(^\text{13}\) According to the studies in the United States,\(^\text{14, 15}\) electronic cigarette smokers are more likely white people with higher education and higher income status than conventional cigarette smokers. This finding is dissimilar to the current study, in which the majority (74.2%) of the higher educated smokers are Shisha smokers.

Our analysis is consistent with the findings of a study in Pakistan,\(^\text{16}\) regarding different forms of tobacco used by Shisha smokers reporting that smoking duration was 20-30 minutes among 58% of the Shisha smokers; however, it contradicts another study, which reported 15-30 minutes of smoking Shisha.\(^\text{17}\) Electronic cigarette smokers generally believe that e-cigarettes are much healthier than conventional cigarettes and reduce or quit smoking. About 66.1% of ECIG smokers were willing to quit smoking in the present study, which was found consistent with the study of Rutten et al.\(^\text{18}\)

Curiosity was the reason for smoking for most participants in the present study, which was also a common finding of other studies;\(^\text{16-19}\) however, it contradicts Malaysia’s study reporting that friends and family influenced their smoking.\(^\text{20}\)

The risk of transmission of Hepatitis C is more among community practice of smoking because sharing the same mouthpiece between individuals with oral lesions can transmit the virus.\(^\text{21}\) This is similar to the present study in which the majority (50.6%) of the Shisha smokers were also not aware that communicable infectious diseases such as tuberculosis, hepatitis C, herpes, and influenza could be transmitted to others on sharing; however, it contradicts other studies which reported that the majority of the participants were aware.\(^\text{22}\)

Several cross-sectional studies conducted in Saudi Arabia reported that water-pipe smoking (Shisha) is associated with periodontal bone loss and teeth mobility.\(^\text{23}\) About (58.8%) of Shisha smokers were aware in the present study. Bad breath and dry mouth are long-term effects of Shisha smoking, which were reported in a study by Zaatari et al. and were also agreed by the majority of Shisha smokers (85.9% & 57.6%) in the present study.\(^\text{23}\)

Compounds that bind to nucleic acids are potentially

\begin{table} [H]
\centering
\begin{tabular}{|c|c|c|c|c|c|c|c|c|}
\hline
Does smoking causes bad smell / bad breath in mouth? & Yes & 2 & 20.0 & 25 & 65.8 & 91 & 83.5 & 37 & 88.1 & 30.12 & <0.00 1** \\
& No & 8 & 80.0 & 13 & 34.2 & 18 & 16.5 & 5 & 11.9 & & \\
\hline
Are you aware that smoking causes caries? & Yes & 4 & 40.0 & 11 & 28.9 & 90 & 82.6 & 42 & 100.0 & 66.25 & <0.00 1** \\
& No & 6 & 60.0 & 27 & 71.1 & 19 & 17.4 & 0 & 0.0 & & \\
\hline
Are you aware that smoking causes stains on teeth? & Yes & 5 & 50.0 & 20 & 52.6 & 72 & 66.1 & 24 & 57.1 & 3.632 & 0.304 NS \\
& No & 6 & 60.0 & 18 & 47.4 & 37 & 33.9 & 18 & 42.9 & & \\
\hline
Are you aware that smoking causes mobility of teeth? & Yes & 2 & 20.0 & 11 & 28.9 & 68 & 62.4 & 39 & 92.9 & 28.45 & <0.00 1** \\
& No & 8 & 80.0 & 27 & 71.1 & 41 & 37.6 & 3 & 7.1 & & \\
\hline
Are you aware that smoking causes gum bleeding? & Yes & 8 & 80.0 & 6 & 15.8 & 47 & 43.1 & 30 & 71.4 & 24.11 & <0.00 1** \\
& No & 2 & 20.0 & 32 & 84.2 & 62 & 56.9 & 12 & 28.6 & & \\
\hline
Are you aware that smoking causes coated tongue? & Yes & 4 & 40.0 & 20 & 52.6 & 71 & 65.1 & 24 & 57.1 & 3.171 & 0.366 NS \\
& No & 6 & 60.0 & 18 & 47.4 & 38 & 34.9 & 18 & 42.9 & & \\
\hline
\end{tabular}
\caption{Education Level and Knowledge and Awareness of smoking effects on oral health}
\end{table}
carcinogenic. Tobacco is the most critical risk factor for oral cancer. El-Hakim et al. found a positive correlation between lip, cheek, and mouth cancers (squamous cell carcinoma & keratoacanthoma) and Narghile smoking. Their research noted that Narghile tobacco is made up of a juicy ingredient that leads to chronic irritation, increasing susceptibility to malignancy of the mouth. In this study, the majority (67.6%) of dual smokers and Shisha smokers (67.1%) showed more knowledge and awareness than ECIGs smokers about the statement that smoking causes oral cancer. 

Gingival bleeding and gums inflammation were more prevalent among Shisha and ECIG smokers in one of the studies. This finding contradicts the present study in which the majority of the participants of Shisha (61.2%) and ECIGs smokers (55.9%) were not aware of it.

A study conducted in the UAE found that Shisha smokers showed stains, caries, bad breath, mobility of teeth, and dry mouth, that are consistent with the present study.

In one of the studies conducted in Saudi Arabia, the knowledge of smoking Shisha's adverse effects was found inadequate among university dental students. It contradicts our present study, which reported that the knowledge and awareness of smoking's effects on oral health among higher educated smokers were found adequate than the lower educated ones.

Strengths and Limitations

Many studies were reported on Shisha and electronic cigarettes in other countries, but minimal information is available from Saudi Arabia, particularly on these products' oral health effects. Therefore, this study was one of its kind in Saudi Arabia which targets the Saudi population to assess their knowledge, awareness, and practice of Shisha, ECIGs, and dual smoking on oral health. On the other hand, this study's limitation is that it is an institution-based study targeted at a specific region or province population and is not representative of entire Saudi Arabia. Therefore, further studies should be done in multiple regions or provinces, involving different Saudi Arabian population.

Lack of awareness programs and policies controlling Shisha and ECIG smoking are the factors responsible for these products' popularity. Implementation of preventive programs highlighting the ill effects of Shisha and ECIG smoking on oral and systemic health among the Saudi Arabian population is highly recommended.

Conclusion

Overall, knowledge and awareness of non-smokers and smokers with higher education were found to be adequate compared to smokers with primary and high school levels of education. Among smokers, the knowledge of dual smokers was reported adequate than Shisha and ECIG ones. However, awareness was found inadequate among Shisha smokers than ECIG ones. The knowledge and awareness of postgraduate and graduate smokers were found more than primary and high school smokers. It was alarming to find that, despite higher education of the participants and good knowledge and awareness about the deleterious effects of smoking, the prevalence of smoking was high among dental patients seeking care at university dental clinics.

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References


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