Tobacco consumption is considered a global health issue. According to the latest report by the World Health Organization (WHO), tobacco consumption causes 8 million deaths annually. Concerning this, smoking hookah and tobacco acts as a major risk factor. This issue is even more significant in developing countries considering the increasing trend of deaths due to hookah and tobacco consumption in developing countries. In the near future, this rate will increase (1, 2).

Hookah smoking is associated with many adverse effects including cardiovascular diseases, impaired sex hormones, different types of cancer, yellow face and teeth, pulmonary diseases, emergence of wrinkles, oral malodor, and low birth weight. Besides the physical adverse effects, there are certain mental damages involved too, which can occasionally pave the way for drug addiction too (3). Tobacco consumption affects women's general health, pregnancy, and menopause. Besides, female tobacco smokers are prone to diseases such as cervical cancer, estrogen deficiency, disrupted menstrual cycles, premature menopause, low bone mass, primary and secondary infertility, and ectopic pregnancy (4).

Within the past two decades, the rate of hookah smoking...
has been increasing in many countries and there is evidence that hookah smoking by girls and women is significantly on the rise (5). In Iran, this disease is more prevalent in the south compared to other geographical areas (6).

The related literature showed that the prevalence of smoking hookahs was reported to be 14.8% in Hormozgan (7) and 13.6% in Bandar Abbas (8). Moreover, the related literature showed that hookah smoking is more prevalent among women than men (9).

Different factors have increased the rate of hookah smoking among women. These factors include a positive attitude towards hookah consumption, social and psychological needs, social and cultural acceptance of hookah, easy access, lack of prohibitory rules and regulations, and low perceived risk of hookah smoking (9). In fact, the majority of hookah smokers believe that the adverse effects of hookah smoke are fewer than those of cigarettes. However, scientific evidence has shown the presence of certain cancerous and toxic materials in the hookah smoke so that each hookah smoking can enter cancerous aromatic carbohydrates into the body 50 times as high as one cigarette (10, 11).

Considering the increasing trend of hookah smoking especially among women, if effective and appropriate changes are not made in order to prevent or reduce hookah smoking, along with the increasing prevalence of consumption, smoking can affect the whole population (12).

Education is one of the most applicable ways of reducing tobacco consumption (13). Therefore, designing and implementing educational programs to reduce hookah smoking among girls and young women seem essential.

Education is a fundamental basis of preventive measures that can cause stable changes in people's attitude and performance and can finally change their lifestyle (14). A study showed that educational campaigns were effective in reducing the rate of tobacco consumption (15).

Campaign refers to a series of informative, communicative, and educational activities through different channels combined aiming to convey target messages to a given population within a particular time limit to serve a particular purpose (16). Research findings have shown that an effective campaign along with reliable messages influences public attitude and behavior. If campaigns address a particular sub-section of the population rather than the whole population, it can be much more effective (17).

The relevant findings show that the model of tobacco consumption is a function of complicated social and structural processes (18). Considering this complication, it is essential to use the theories of behavioral change to determine effective factors involved in this behavior (19).

Sharma introduced the theory of planned behavior (TPB) (20). In this theory, the foremost factor involved in showing the behavior was behavioral intention (21), which is in turn predicted by three factors, including attitude towards behavior, subjective norms, and perceived behavioral control. The attitude towards behavior is a positive or negative evaluation of showing the target behavior. It consists of two constructs: behavioral beliefs and evaluation of behavioral outcomes which can help to create a certain attitude towards a behavior (20). Subjective norms refer to the perceived social pressure one experiences while showing or not showing the target behavior (22). Perceived behavioral control is a degree of feeling in control of a behavior. Behavioral intention represents the intensity of willingness and a will to show a certain behavior. Behavior always follows from the behavioral intention and is closely connected with it (23, 24).

Different studies acknowledged the effectiveness of the TPB in predicting hookah smoking and reducing the rate of tobacco consumption (2, 4, 25). Considering the rising trend of hookah smoking among women (9) and the prominent role of women in the family as a role model, reducing the use of hookah in them is essential to maintain the health of the family and society. Furthermore, the effective educational role women play in families, often setting examples to follow, adds to the significance of reducing hookah smoking among them to maintain social health and guarantee the health of generations (12). Therefore, the present research aimed to explore the effect of an educational campaign based on the TPB on the reduction of hookah smoking among women above 15 years of age living in Hormoz Island in the south of Iran.

Materials and Methods
This quasi-experimental study with a pre-test post-test design was conducted on women above 15 years of age living in Hormoz Island in 2020. The sample size was 177. Hormoz Island has a small population so it was not possible to have a control group in the study.

Sampling
To select the required sample through simple randomization, based on the household records, a list of women above 15 years of age was made. They were visited at home and were asked about hookah smoking. When any individual participant was selected according to the inclusion criteria, a brief explanation of the purpose of the study was provided and if the individual was willing to participate, the questionnaire was given. According to the related literature, a hookah smoker is one who has smoked hookah for at least one day during the past week (26).

Because the environment of Hormoz Island was limited and there was a possibility of communication between the two groups of intervention group and control group, we
did not have any control group. By referring to Hormoz Island Health Center, a list of women over 15 years old was prepared and they were asked about hookah use. The eligible subjects were identified according to the inclusion criteria and were included in the study if desired.

The inclusion criteria were being over 15 years of age, smoking hookah for at least a year, living in Hormoz Island, and having willingness to participate in research and complete the questionnaire. Additionally, illiterate participants were asked questions orally. The exclusion criterion was not completing the questionnaire in the campaign programs.

Data Collection Tools
The required data were collected via a standard questionnaire made up of two sections. The first section explored demographic information such as age, education level, occupation, history of smoking hookahs, and attempts to stop smoking hookahs. The second section included items exploring the constituent constructs of the TPB and hookah smoking behavior. All items concerning the constructs were rated on a 5-point Likert scale. The behavioral intention construct was measured with 2 items. To score intention to reduce hookah smoking, the scores of these two items were added up. The minimum score for the intention to reduce hookah smoking was 2 and the maximum score was 10.

Attitude was measured with the sub-constructs: behavioral beliefs (4 items) and evaluation of outcomes (4 items). The minimum score for attitude was 8 and the maximum score was 40. Moreover, the minimum and maximum scores for behavioral beliefs and evaluation of outcomes were 4 and 20.

The subjective norms construct was measured with its sub-constructs including normative beliefs (4 items) and motivation to comply (4 items). The minimum and maximum subjective norms scores were 8 and 40. Besides, the minimum and maximum scores for normative beliefs and motivation to comply were 4 and 20, respectively.

Perceived behavioral control was measured with its sub-constructs including control beliefs (5 items) and perceived power (5 items). The minimum and maximum perceived behavioral control scores were 10 and 50. Moreover, the minimum and maximum scores for control beliefs and perceived power were 5 and 25.

In each of the above-mentioned constructs, first, the scores related to the subscales (matching pairs) were multiplied and then the results were added together.

Hookah smoking behavior (3 items) was measured as the frequency of smoking hookah within the past month, the frequency of smoking hookahs within the past week, and the act of stopping smoking. The reliability and validity of the questionnaire were confirmed in a study by Firoozabadi et al (4).

4 Steps of the Study
1. A Pretest
The above-mentioned questionnaire was completed as a self-report by the participants.

2. Development of a Communicative Message for the Program
First, guided by the pretest results, the constructs of the TPB correlating with reduced hookah smoking were identified so as to develop the content for educational messages. The messages were developed based on a review of credible scientific sources (27, 28) and in the next step, the selected messages were evaluated by a panel of 4 experts in health education and promotion as well as the field specialists. Once they were confirmed, they were put to use. In order to develop a correct attitude, information was provided on the desirable effect of not smoking hookahs, prevention of premature aging and loss of physical attraction, positive effect on the lower risk of diseases, higher quality of life and so on. Concerning the effect on subjective norms, emphasis was put on the comments made by successful individuals about stopping tobacco consumption. Besides, the educational pamphlets were distributed to women and they were persistently asked to provide influential people around them with pamphlets and to encourage them to read through the pamphlets. This would adequately inform the influential people around the smoker about the detriments of hookahs and benefits of stopping hookah smoking. This would increase the chances of approving the target behavior. In order to increase perceived behavioral control and facilitate the act of reducing the hookah smoking behavior, decisions were made on when and where to make the intervention, the promoters and inhibitors of the behavior, and how to overcome barriers to the behavior. Accordingly, the educational messages were conveyed to the participants.

3. Communicative strategies
The strategies used included face-to-face meetings, development and distribution of educational pamphlets, putting up educational banners and posters regarding the adverse effects of hookah smoking especially among women residing in the island with the help of city hall, use of successful models among women, creation of WhatsApp group, sending persuasive text messages every 10 days, and use of educated messengers and peer group.

Implementation the Campaign
The campaign was held through the following channels:
• Cell phone: A group was formed in WhatsApp to include all participants. The educational content was posted as videos and questions and answers. Moreover, the educational pamphlets and posters were posted in the group.
• **Putting up billboards:** Two billboards were put up, one reading "each time smoking hookah equals smoking 70-100 cigarettes on average and each hour of hookah secondary smoking equals smoking 6-8 cigarettes". The other read "Smoking hookah during pregnancy can have severe adverse effects such as stillbirth, spontaneous abortion, fetal death, and unexpected fetal death". This content was developed by the present researchers and put up on billboards across the city, authorized by the city hall.

• **Distributing pamphlets:** Two types of educational pamphlets were developed containing information about the adverse effects of smoking hookah and strategies of reducing smoking. The pamphlets were distributed among attendants of the educational sessions, audience in WhatsApp, family, and friends.

• **Putting up posters:** Two types of posters were prepared and provided for the audience in the WhatsApp group and in the healthcare center.

• **Holding face-to-face classes to educate people:** During the two educational sessions, face-to-face instructions were provided along with question and answer (Q & As) and group discussions. The content of the first session concerned the adverse effects of hookah smoking and that of the second session was about the required skills to reduce the rate of hookah smoking.

• **Peer group:** Peers were used to encourage the participants to take part in face-to-face educational classes. The peer group was people who had successful experience in quitting hookah smoking. Moreover, they joined the WhatsApp group and informed the researcher and designer of the study of the questions and answers (Q & As) exchanged. They also cooperated in the distribution of questionnaires and educational pamphlets.

**4. Evaluation of Campaign**

During the present research, in order to evaluate the strengths and weaknesses and follow up the procedures based on the goals specified, phone calls were used as well as face-to-face talks with the participants to receive feedback. Moreover, in order to explore the effect of the educational campaign on the reduction of hookah smoking, the questionnaires were first distributed before the campaign and once again 3 months after the campaign and the results were cross-compared.

**Data Analysis**

The acquired data were analyzed in the SPSS software version 22.0 using paired t-test, McNemar’s test. The significance level was set at \( P < 0.05 \). The normality assumption was tested and confirmed by Kolmogorov-Smirnov test.

**Table 1. Distribution of Demographic Features among Research Participants**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uneducated</td>
<td>3</td>
<td>1.7</td>
</tr>
<tr>
<td>Elementary school</td>
<td>70</td>
<td>39.5</td>
</tr>
<tr>
<td>Junior high school</td>
<td>63</td>
<td>35.6</td>
</tr>
<tr>
<td>Diploma</td>
<td>40</td>
<td>22.6</td>
</tr>
<tr>
<td>Associate degree or higher</td>
<td>1</td>
<td>0.6</td>
</tr>
<tr>
<td>Occupation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employee</td>
<td>3</td>
<td>1.7</td>
</tr>
<tr>
<td>Housewife</td>
<td>174</td>
<td>98.3</td>
</tr>
<tr>
<td>Spouse’s education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uneducated</td>
<td>16</td>
<td>9</td>
</tr>
<tr>
<td>Elementary school</td>
<td>57</td>
<td>32.2</td>
</tr>
<tr>
<td>Junior high school</td>
<td>67</td>
<td>37.9</td>
</tr>
<tr>
<td>Diploma</td>
<td>33</td>
<td>18.6</td>
</tr>
<tr>
<td>Associate degree or higher</td>
<td>4</td>
<td>2.3</td>
</tr>
<tr>
<td>Spouse’s occupation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employee</td>
<td>8</td>
<td>4.5</td>
</tr>
<tr>
<td>Labor work</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>Freelance</td>
<td>149</td>
<td>84.2</td>
</tr>
<tr>
<td>Unemployed</td>
<td>13</td>
<td>7.3</td>
</tr>
<tr>
<td>History of hookah use</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than a year</td>
<td>30</td>
<td>16.9</td>
</tr>
<tr>
<td>Less than 5 years</td>
<td>40</td>
<td>22.6</td>
</tr>
<tr>
<td>5-10 years</td>
<td>42</td>
<td>23.7</td>
</tr>
<tr>
<td>More than 10 years</td>
<td>65</td>
<td>36.7</td>
</tr>
<tr>
<td>History of smoking hookah in family</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>96</td>
<td>54.2</td>
</tr>
<tr>
<td>No</td>
<td>81</td>
<td>45.8</td>
</tr>
</tbody>
</table>
Health Education Campaign for Reduction of Hookah Smoking

After conducting the educational campaign, 6 (3.4%) of the participants stopped smoking hookah.

Discussion

People smoking hookah justify their continued habit of smoking by erroneous perceptions of hookah and hookah smoking. These perceptions should be recognized and discarded. The present research explored the effect of an educational campaign based on the TPB on the reduction of the rate of hookah smoking among women above 15 years of age living in Hormoz Island.

Table 2. Cross-comparison of the Constructs of the TPB Concerning Reducing Hookahs among Research Participants in the Pre and Post-test

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pre-test</th>
<th>Post-test</th>
<th>Mean Difference</th>
<th>T</th>
<th>P Valuea</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intention to reduce hookah smoking</td>
<td>5.97</td>
<td>8.46</td>
<td>2.49</td>
<td>-17.48</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Behavioral beliefs</td>
<td>13.07</td>
<td>17.86</td>
<td>4.79</td>
<td>-22.72</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Evaluation of outcomes</td>
<td>17.59</td>
<td>19.34</td>
<td>1.75</td>
<td>-11.77</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Attitude towards reduced hookah smoking</td>
<td>58</td>
<td>86.69</td>
<td>28.69</td>
<td>-25.31</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Normative beliefs</td>
<td>13.76</td>
<td>16.62</td>
<td>2.86</td>
<td>-13.58</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Motivation to comply</td>
<td>11.86</td>
<td>14.97</td>
<td>3.10</td>
<td>-12.63</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Subjective norms</td>
<td>44.95</td>
<td>23.86</td>
<td>19.60</td>
<td>-15.52</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Control beliefs</td>
<td>9.99</td>
<td>15.19</td>
<td>5.19</td>
<td>-18.80</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Perceived power</td>
<td>12.85</td>
<td>18.30</td>
<td>5.44</td>
<td>-12.53</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Perceived behavioral control</td>
<td>28.94</td>
<td>52.68</td>
<td>23.74</td>
<td>-15.58</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

SD, standard deviation.
a Paired t test result.

Table 3. Cross-comparison of the Frequency of Smoking Hookahs per Week and Per Month among Participants before and after the Educational Campaign

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pre-test</th>
<th>Post-test</th>
<th>Difference of MEAN</th>
<th>T</th>
<th>P Valuea</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency of hookah smoking per week</td>
<td>20.85</td>
<td>12.58</td>
<td>-8.25</td>
<td>15.53</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Frequency of hookah smoking per month</td>
<td>80.18</td>
<td>49.57</td>
<td>-30.59</td>
<td>16.37</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

SD, standard deviation.
a Paired samples t test result.

Table 4. Cross-comparison of Frequency Attempts to Cease Hookah Smoking by Participants Before and After the Educational Campaign

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pre-test</th>
<th>Post-test</th>
<th>P Valuea</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes No %</td>
<td>Yes No %</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Attempts to stop smoking hookah</td>
<td>46 26 131 74 139 78.5 38 21.5</td>
<td></td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

a McNemar's test.
The results of a study conducted by Makvandi et al on students' attitudes towards hookah smoking showed that they continued hookah smoking because they thought it was not addictive, which is not consistent with our study (25).

**Subjective Norms**
The present research showed that the mean score of subjective norms was significantly increased among women participating in the educational campaign. That is to say that the more pressure the family members and influential people around the smoker exert and the more likely they encourage her to give up the habit, the more likely the smoker adopts the healthy behavior in practice. Therefore, in order to reduce the rate of hookah smoking among girls and women, special attention needs to be paid to the influential people around them. On the one hand, smoking friends and peers and on the other hand, the sense of belonging to a group which is a key human need can be among the effective factors involved. The strength of the effect would depend on every individual's living conditions (34). Findings of studies by Momenabadi et al (35), Joveini et al (36), Jafari et al (37), and Barati et al (38) are similar to the results of our study, indicating an increase in perceived behavioral control. Similar studies also showed a high predictive power of perceived behavioral control in intention to consume addictive drugs (39). Perceived behavior control is in turn affected by control beliefs and perceived competence to adopt a certain behavior. In other words, if people believe that they lack the capabilities and facilities needed for a certain behavior, even if that behavior is approved by influential people around them (subjective norms), they do not show that behavior. Moreover, in a body of social psychological research, the level of behavioral control showed to be low in people with low self-confidence and self-efficacy. Therefore, such people are more prone to drug abuse under the influence of others. If these people are educated and enabled to confidently reject others' invitation to smoke, they will be less prone to social threats and their perceived behavioral control will be increased (21). Research findings reported by Fathi et al (2) with the aim of determining the effect of an educational program based on the TPB on preventing and reducing tobacco consumption among university students of medical sciences were not consistent with the present findings.

**Perceived Behavioral Control**
The present research showed an increase in perceived behavioral control. This contradiction can be explained by different research populations, purposes of research, and types of interventions involved. The present research revealed that the mean score of intention to reduce hookah smoking among women participants significantly increased after the educational campaign. This can point to the effectiveness of the educational campaign and can also result from an increase in the other constructs of the theory (attitude, subjective norms, and perceived behavioral control). According to the existing literature, intention plays a key role in forming or changing a certain behavior. Generally, a behavior follows from one's intention to show it. In other words, the behavior does not emerge unless it follows from the behavioral intention (40). The research findings reported by Dehdari et al (33) about hookah smoking by university students, Momenabadi et al (41) on intention to smoke hookahs among male and female university students, and Mojahed & Navidian (42) on pregnant women showed that the mean score of behavioral intention to cease smoking hookah was significantly increased in the intervention group compared to the control after the educational intervention. The research findings by Luo et al (43) who investigated the effect of two policies, cigarette smoking prohibition in public places and educational campaigns to convey messages of quitting smoking among cigarette smokers in China, showed that smokers influenced by the above-mentioned policies had a stronger intention to stop smoking than others. In another study, Davis et al (44) evaluated a program aiming to fight tobacco consumption in New York via a media campaign (graphical images and emotional pictures to illustrate the adverse effects of cigarette smoking) and indicated that exposure of smokers to the advertisement in the target campaign could increase both intentions and attempts to stop smoking cigarettes. However, the results of a study by Tavousi et al is inconsistent with the results of our study on perceived behavioral control (45)

Behavior: The present results revealed that the frequency of smoking hookah by women participants reduced after the educational campaign. This reduction can be explained by the effectiveness of the educational campaign. Admittedly, participants' increased knowledge and susceptibility to the risks and diseases associated with hookah smoking through the educational campaign along with an increase in the constructs of the TPB (attitude, subjective norms, perceived behavioral control, and intention) could positively affect the participants' behavior. Setoudel et al (13) explored the reduction of hookah smoking among women and Dehdari et al (33) reported a lower rate of hookah smoking based on the TPB among university students. They reported the positive effect of the educational intervention in the intervention group. Karimy et al (46) evaluated the impact of an educational program designed based on Kemp model of promoting smoking refusal ability and reported that it was effective in reducing the rate of smoking among adolescents. Similarly, Barfi et al (34), Mohammadi Zeidi and Pakpour Hajiagha (47), and Bashirian et al (39) reported a reduction in tobacco consumption after an educational intervention based on the TPB.
can be partly explained by the effect of the educational method on participants that could reduce behavioral intention and finally hookah consumption. Davis et al (44) reported that implementing an educational program via a media campaign could reduce the rate of smoking cigarettes (18%) among the participants. Yothasamut et al (48) evaluated the effectiveness of interventions including a TV and radio campaign and setting rules to limit the availability of alcohol in reducing alcohol consumption among construction workers. These researchers found out that alcohol consumption was stopped among workers receiving the messages. They also found that matching educational campaign with religious beliefs can help motivate workers to stop consuming alcohol.

Another finding of the present research was that 6 participants (3.4%) stopped smoking hookah after the educational campaign. Higher affective attitude and intention to stop smoking among these participants before the educational campaign as well as the lower frequency of smoking among these people than others can be among the reasons why they quit smoking. The results of studies by Lipkus et al (49), Dogar et al (50), and Mohlman et al (51) also agree with the present findings and indicate the stopping of hookah smoking by some members of the intervention groups.

One limitation of the present study is the use of self-reports to collect the required data, which is accompanied by chances that the information provided lacks enough precision or is exaggerated. Other limitations include the conduction of the study in a limited region, the absence of a control group, and use of a small sample size and short-term follow-up.

Conclusion
In the light of the present findings, it can be concluded that the educational campaign designed based on the TPB could effectively reduce the frequency of hookah smoking among girls and women living in Hormoz Island by influencing perceived attitudes, subjective norms, and behavioral control. This effectiveness can be accompanied by fewer physical, mental, and social adverse effects of hookah smoking. Therefore, considering the fact that health education programs are cost-effective interventions to promote health in society and given the positive results obtained in the present research, it is suggested that this theory be used in educational programs at different preventive levels. It is also suggested that further studies with a longitudinal design be conducted to include both genders to evaluate the present findings.

Acknowledgements
The authors would like to thank all of the participants in the study.

Authors’ Contributions
SSH provided research proposal and final report. SSH and AGH did the data collection and analysis, TA and ZH provided, reviewed, and edited the manuscript. HF also participated in manuscript provision. All authors read and approved the final manuscript.

Available Data and Materials
The datasets used and analyzed during the current study are available from the corresponding author on reasonable request.

Conflict of Interest Disclosures
The authors declare no competing interests.

Ethical Statement
This study was approved by the Ethics Committee of Hormozgan University of Medical Sciences (Code: IR.HUMS.REC.1397.278).

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