Review Paper
Factors Related to Hookah Smoking Among the Iranian Population: A Systematic Review

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ABSTRACT

Background: Hookah smoking has become prevalent, especially among the Iranian population. Knowing the associated factors is essential in designing preventive interventions. This systematic review was conducted to consolidate the factors linked to hookah smoking in the Iranian people.

Materials and Methods: This study searched 3 Iranian databases—Magiran, SID, and IranMedex—for articles in Persian and 4 international databases—Scopus, PubMed, Web of Science, and Google Scholar, for articles in English. The search spanned from April 23, 2023, using the keywords “waterpipe,” “hookah,” “goza,” “shisha,” “hubble bubble,” “narghile or smoking,” and “predictive factors or predictors.” This review followed the PRISMA (the preferred reporting items for systematic reviews and meta-analyses) framework.

Results: The review included 16 studies (7 English papers and 8 Persian articles). Based on these studies, positive attitudes towards hookah smoking, subjective norms, self-efficacy, perceived threat, socializing with friends, passing leisure time, entertainment, unemployment, pleasant feeling, reducing anxiety and fatigue, and easy access to hookah were related to hookah smoking.

Conclusion: The synthesized evidence from this systematic review highlights the influence of social, cultural, and contextual factors, such as unemployment, anxiety, fatigue, and easy access, on hookah smoking in Iran. Incorporating the above factors in designing and implementing public health interventions might effectively deter hookah use among Iranians.
Introduction

Tobacco consumption, including hookah, stands as the fourth-ranked risk factor in the overall burden of diseases, imposing an enormous health, social, and economic burden worldwide [1]. Hookah smoking is now becoming more common around the globe, including among the Iranian people [2]. Smoking remains the number one preventable cause of morbidity and mortality in the world [3].

About 100 million people smoke hookah every day worldwide, with recent statistics revealing a high rate of hookah consumption in recent years [4]. Recent research indicates that 4.3% of US adults smoke hookah every day. In Iran, the prevalence of hookah smoking has increased from 5.7% in 2008 to 62.5% in 2018 [5]. Moreover, a recent study in Iraq showed an “alarmingly” high rate of hookah smoking in male high school students. If the current trend continues by 2030, smoking-related deaths are expected to be more than 8 million annually, with more than 80% occurring in low-income and developing countries [6].

Hookah contains nicotine and produces more tar and carbon monoxide than cigarettes. Studies have long supported the association of hookah use with lung cancer, respiratory illness, dental problems, low birth weights, esophageal cancer, decreased pulmonary and cardiovascular function, dental problems, infertility, and infectious diseases [7].

Several factors contribute to the rising trend of smoking hookah. This risky behavior is often fueled by a lack of knowledge about its harms, social acceptance, the availability of various tobacco flavors, low costs, gaining personal and social identity, enjoyment, and self-esteem [8]. According to the World Health Organization (WHO), misconceptions about hookah’s safe and harmless nature constitute the main reason for its consumption [9].

To address and control hookah smoking, its related factors should be determined [10]. Successful strategies for reducing hookah use should incorporate these factors [11] in the design of effective interventions and education programs [12].

This systematic review was conducted to identify factors related to hookah smoking in the Iranian population.

Materials and Methods

Search strategies

The search spanned from April 23, 2023. We explored Magiran, SID, and IranMedex for Persian articles and Scopus, PubMed, Web of Science, Google Scholar, and Embase for English articles. In addition, we conducted a manual search of student dissertations and the references of selected articles to find more relevant articles on this topic.

The search had no time constraints, but studies had to be completed in Iran. The search keywords included “waterpipe,” “hookah,” “goza,” “shisha,” “hubble bubble,” “narghile or smoking,” and “related factors,” “predictive factors,” “predictors,” “causes,” and “elements or determinants.”

PRISMA (the preferred reporting items for systematic reviews and meta-analyses) was the basis for formulating this systematic review, starting from the research questions to developing the search strategy, the inclusion and exclusion criteria, assessment, and data extraction of included studies [14].

Inclusion and exclusion criteria

The eligible studies should be all original research observation studies conducted in Iran to find factors associated with hookah consumption. Interventional studies were excluded because they have been reviewed in another paper [13]. Studies conducted outside Iran were excluded as well.

Quality assessment

PRISMA framework was used throughout this review to assess the extracted studies. PRISMA is a guide designed to improve the structure of reviews. The framework contains 27 items related to the content of a systematic review and meta-analysis, including abstracts, methods, results, discussions, and financial resources. Overall, it serves to improve the quality and reporting of a systematic review [15].

Extracting data

Two researchers screened the retrieved articles. They checked their eligibility, and disagreements were resolved through discussions until a consensus was reached. In cases of remaining disputes, a third person’s opinion was sought. In reviewing the articles, the title and the abstract were first reviewed, and then, if necessary, the entire text of the article.
Data were extracted from selected papers in pre-defined forms. The extracted information included the authors, the study setting, the year of the study, the study purposes, the target group, the population size, and the most important results (Table 1).

Results

After searching the aforementioned electronic databases, 2066 related articles (1091 in English and 975 in Persian) were retrieved. Many articles (1427 articles) were duplicates and were deleted. Of the remaining 639 articles, 457 were excluded because they were interventional articles, reviews, or letters to editors. Also, 162 studies were excluded because they were conducted outside Iran or about preventing cigarettes and hookahs. Finally, 20 studies (12 English papers and 8 Persian articles) entered the review (Figure 1).

The information extracted from studies is summarized in Table 1.

Discussion

An increased prevalence of hookah smoking in the Iranian community in recent years is probably due to a lack of knowledge about hookah’s addictive and harmful characteristics. This knowledge gap may have contributed to hookah use in family gatherings and public places [5]. This systematic review attempted to identify factors related to hookah smoking in the Iranian population.

The included studies were either conducted according to health education models and theories or without them. In studies performed with health education theories/models, the protection motivation theory (PMT), theory of planned behavior (TPB), extended parallel process model (EPPM), or prototype/willingness model (PWM) had been used.

The most widely used theory was the TPB, employed in three studies. These studies’ results indicated that the TPB constructs were associated to use hookah. Behavioral intention means the willingness of people to perform different behaviors. Therefore, intention is one of the main factors determining people’s smoking [26].
Table 1. Summary of articles included in this review

<table>
<thead>
<tr>
<th>Author/Year</th>
<th>Place</th>
<th>Study Population/Size of the Sample</th>
<th>Purpose of the Study</th>
<th>Study Variables</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kariry, 2012</td>
<td>Markazi Province of Iran</td>
<td>380 Iranian male adolescents aged between 15-19 years</td>
<td>Examined the relation between refusal self efficacy, self esteem, smoking refusal skills and water pipe (hookah) smoking</td>
<td>Self efficacy, self esteem, smoking refusal skills</td>
<td>The prevalence of water pipe smoking was 17.3%. Logistic regression revealed that knowledge (OR=0.56; 95% CI, 0.37%-0.79%), attitude (OR=0.69; 95% CI, 0.52%-0.89%), self esteem (OR=0.67; 95% CI, 0.55%-0.82%), smoking refusal skills (OR=0.73; 95% CI, 0.55%-0.87%), and self efficacy (OR=0.82; 95% CI, 0.61%-0.93%) were all significant predicting factors for adolescents WP smoking.</td>
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<tr>
<td>Abedini, 2013</td>
<td>Bandar Abbas, Southern Iran</td>
<td>240 high school students (grade 9, 10, 11)</td>
<td>Determined predictors of refraining from hookah smoking among high-school students in Bandar Abbas, southern Iran based on Prototype/Will- ingness model</td>
<td>Subjective norms, willingness, and attitude</td>
<td>Attitude and subjective norms predicted 36.0% of the non-smoking hookah intention variance. There was a significant relation between the participants’ negative prototype about hookah smokers and their willingness to avoid hookah smoking (P=0.002). Also willingness predicted not smoking hookah better than intention (P&lt;0.001).</td>
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<tr>
<td>Dehdari, 2011</td>
<td>Tehran, Iran</td>
<td>162 male students living in dormitories at Tehran University of Medical Sciences</td>
<td>Determined the factors affecting hookah smoking in male students who were living in dormitories of Tehran University of Medical Sciences</td>
<td>Personal characteristics</td>
<td>The results showed that 29% of subjects had a history of smoking hookah. The main factors affecting the use of hookah from subjects point of view, were filling leisure time, cost effectiveness, anxiety reduction, refreshment and easy access to the hookah.</td>
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<tr>
<td>Bashirian, 2016</td>
<td>Kermanshah City, West of Iran</td>
<td>601 high school male students</td>
<td>Investigated the roles of psychological and demographic factors associated with hookah use among male high school students</td>
<td>Psychological and demographic factors</td>
<td>Pleasure (28.1%) and sensation seeking (22.5%) were common reasons of hookah use. In comparison to non-users, hookah users evaluated a typical hookah better than intention (P&lt;0.001).</td>
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<tr>
<td>Fakhrari, 2011</td>
<td>Tabriz, Northwest of Iran</td>
<td>5197 high school students</td>
<td>Estimated the prevalence and transition rates in hookah smoking statuses and predictors of transitions</td>
<td>Psychosocial factors</td>
<td>Adjusted for other factors, being male, regular cigarette smoking, and positive attitude toward smoking were factors associated with students’ transition to hookah smoking.</td>
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<tr>
<td>Khani Jeihooni, 2015</td>
<td>Fars Province, Iran</td>
<td>157 university students</td>
<td>Assessed knowledge and attitudes of university students towards hookah smoking in Fasa, Iran, based on the theory of planned behavior (TPB)</td>
<td>Attitude and behavioral intention</td>
<td>The scores of behavioral intention and attitude were higher among male participants (P=0.0001 and P=0.004, respectively). However, females obtained significantly higher scores regarding peer opinion (P&lt;0.001).</td>
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<tr>
<td>Ghorbani, 2013</td>
<td>Kurdkoy Province, Iran</td>
<td>266 teenagers</td>
<td>Investigated the causes of hookah smoking in adolescents</td>
<td>Tendency to hookah smoking</td>
<td>The reasons were pastime (56.4%), unemployment (41.7%), pleasant feeling (33.8%), being with friends(33.5%), fatigue reduction (33.5%) and the availability of hookah (32.3%).</td>
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<tr>
<td>Bashirian, 2017</td>
<td>Hamadan City, Iran</td>
<td>730 high school male students</td>
<td>Investigated the role of sociodemographic factors associated with water pipe smoking (WPS)</td>
<td>Demographic variables and behavioral risk factors</td>
<td>Authors found that WPS in the family (OR=2.55, 95% CI, 1.40%-4.64%) was significantly associated with former WPS. Furthermore, being 18 years, studying in technical fields, reporting ever and current smoking of cigarettes and family usage of WP were significantly associated with current WPS. Friends with WPS (OR=0.50, 95% CI, 0.34%-0.72%) however played a protective role on former WPS.</td>
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<td>Author/ Year</td>
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<td>Ebrahimipour, 2012-13 [24]</td>
<td>Mashhad, Iran</td>
<td>400 undergraduate students</td>
<td>Assessed hookah use by the extended parallel process model (EPPM)</td>
<td>Perceived susceptibility, perceived severity and self-efficacy</td>
<td>The mean score of perceived susceptibility ($P=0.006$), perceived severity ($P=0.002$), and self-efficacy ($P=0.098$), to hookah use consequences was more in hookah non-users than hookah users. Mean score of the perceived effectiveness in hookah users was less than non-users ($P=0.008$).</td>
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<td>Firoozabadi, 2015 [12]</td>
<td>Bushehr City, Iran</td>
<td>430 women waterpipe tobacco smokers</td>
<td>Examined the predicting factors affecting continued intention of WPS among women consumers</td>
<td>Affective attitude, instrumental attitude, subjective norm, self-efficacy, perceived behavioral control</td>
<td>There was an association between continued intention of WPS and marital status. Affective attitude ($r=0.57$, $P=0.000$), instrumental attitude ($r=0.44$, $P=0.000$), subjective norms ($r=0.26$, $P=0.000$), self-efficacy ($r=0.27$, $P=0.000$) and perceived behavioral control ($r=-0.17$, $P=0.000$) was associated with continued intention of WPS. Affective attitude was the strongest and subjective norm was the weakest predictors of continued intention for WPS ($R^2=40%$).</td>
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<td>Khaleghi, 2017 [25]</td>
<td>Kerman City, Iran</td>
<td>360 students of Kerman University</td>
<td>Investigated the prevalence of waterpipe smoking and awareness about dental and oral side effects</td>
<td>Awareness</td>
<td>105 (41.27%) persons used water pipe just for entertainment and 120 person (31.3%) used waterpipe in cafes. The mean score of their awareness was 10.47±4.45 out of 18. The rate of good awareness was (33.4%), moderate was (45.4%) and poor was (19.3%). There was a significant relation between gender, marital status and lack of waterpipe smoking awareness.</td>
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<td>Makvandi, 2015-2016 [26]</td>
<td>Asadabad City, Iran</td>
<td>400 students of Asadabad universities</td>
<td>Investigated the factors related to hookah consumption among college students base on the theory of planned behavior (TPB)</td>
<td>Constructs of Theory of Planned Behavior</td>
<td>In addition, among the variables of the planned behavior theory, perceived behavioral control and positive attitude towards hookah smoking were the strongest predictors for intention to use hookah. In total, 78.5% of the behavioral intention variance was explained by the constructs of TPB. Behavioral intention ($\beta=0.489$) was a better predictor for manner compared to perceived behavioral control ($\beta=0.115$).</td>
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<td>Pirdehghan, 2015 [27]</td>
<td>Yazd City, Iran</td>
<td>304 pre-university students</td>
<td>Determining predictive factors for water pipe smoking among pre-university students</td>
<td>Individual, family and social risk factors</td>
<td>Among the demographic variables, gender, student educational status, fathers’ education, household income, rate of tendency to hookah smoking had a significant relation with hookah smoking. And, among variables related to individual, family and social risk factors, negative student attitude, sensation seeking, sensitivity to anxiety, anxiety disorder and, irregularities in social environmental and impaired psychological school environment were considered as the predicting factors of hookah smoking.</td>
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<td>Momeni, 2016 [28]</td>
<td>Kerman City, Iran</td>
<td>675 students of Kerman universities</td>
<td>Determining the effective factors encouraging hookah use in Kerman Medical University and Shahid Bahonar University students</td>
<td>Tendency to hookah smoking</td>
<td>The most important reason of usage was for recreation and the next reason was curiosity. Most of the students believed that using hookah was addictive and increased interest in tobacco use.</td>
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<tr>
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<td>Sabzmakan, 2017</td>
<td>Noshahr City, Iran</td>
<td>440 high school boys</td>
<td>Examined the association between the constructs of the protection motivation theory with intention to hookah use.</td>
<td>Constructs of the protection motivation theory</td>
<td>Perceived vulnerability ($\beta=0.137$, $P&lt;0.001$), fear ($\beta=0.149$, $P&lt;0.001$), self-efficacy ($\beta=0.249$, $P&lt;0.001$), perceived intrinsic reward ($\beta=-0.285$, $P&lt;0.001$), threat appraisal ($\beta=-0.25$, $P&lt;0.001$), and coping appraisal ($\beta=0.358$, $P&lt;0.001$) were directly and significantly related with intention. Moreover, perceived vulnerability ($\beta=-0.158$, $P&lt;0.001$), fear ($\beta=-0.172$, $P&lt;0.001$), self-efficacy ($\beta=-0.288$, $P&lt;0.001$), perceived intrinsic reward ($\beta=0.329$, $P&lt;0.001$), threat appraisal ($\beta=0.265$, $P&lt;0.001$), and coping appraisal ($\beta=0.379$, $P&lt;0.001$) affected hookah use indirectly through intention and were significantly associated with behavior. Also, intention had a direct and significant relation with hookah use ($\beta=-1.156$, $P&lt;0.001$).</td>
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<td>Dadipoor, 2018-2019</td>
<td>Bandar Abbas City, southern Iran</td>
<td>56 participants (21 female hookah smokers, 15 female ex-smokers, and 20 experienced experts)</td>
<td>Explain the determinants of hookah consumption among indigenous women.</td>
<td>Determinants of hookah consumption</td>
<td>Interviews were conducted with 56 participants (21 female hookah smokers, 15 female ex-smokers, and 20 experienced experts). A total of eight main categories were extracted from the data including: positive attitude towards hookah consumption, psychosocial needs, sensory charms of hookah, individual factors, family factors, cultural-environmental backgrounds, social-political backgrounds, and economic challenges.</td>
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<tr>
<td>Dadipoor, 2018-2019</td>
<td>Bandar Abbas City, southern Iran</td>
<td>332 women (hookah smokers)</td>
<td>Determine the predictors of hookah smoking (HS) among professional HS women</td>
<td>Knowledge, attitudes, self-efficacy, habits, and intention</td>
<td>Ordinal regression model, after the control of confounding variables, showed that attitudes, self-efficacy, habits, and intention were the most important predictors of hookah smoking (HS) behavior in women (OR=1.14). The prevalence of HS was 1.76 times higher in women who did not want to quit hookah. Knowledge and Social norms were not associated with the HS behavior.</td>
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<tr>
<td>Bashirian, 2019</td>
<td>Kermanshah, Western Iran</td>
<td>1302 middle and high school females aged 12–18 years</td>
<td>Determine predictors of shisha smoking among adolescent females</td>
<td>Constructs of the prototype-willingness model</td>
<td>Attitude and behavioral willingness and subjective norms were the most important predictors of behavioral intentions, whereas subjective norms, attitudes, and prototypes were the most important predictors for behavioral willingness. The results obtained from the logistic regression analysis revealed that both pathways of prototype-willingness model constructs (behavioral intention OR=1.37; behavioral willingness OR=1.32) were significant predicting factors for shisha smoking among adolescent females.</td>
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</tbody>
</table>
The findings of the Makvandi study showed that perceived behavioral control and positive attitude towards hookah use were the strongest predictors of intent to use hookah [26]. Khani Jeihooni argued that the scores of behavioral intention and attitude were higher among male participants. Despite the students acknowledging that quitting smoking could help prevent many diseases, they continued to smoke hookah due to the perception that it was non-addictive, relieves anxiety and fatigue, and its cessation might lead to losing friends [21].

Another study based on the TPB educational model reports that a positive attitude is the strongest and subjective norm and the weakest predictor of continued intention to smoke hookah [12]. Therefore, considering the effect of individuals’ perceptions and attitudes about the intention to use hookah [33], it is recommended that healthcare professionals focus on changing attitudes in people prone to hookah smoking and strengthen their control against the temptation of hookah [34]. The above findings demonstrate that people’s misconceptions about the safe use of hookah smoking and its social acceptance are the fundamental causes of smoking hookah [35]. This evidence is stipulated in the study from neighboring Iraq, indicating an increased risk of hookah smoking among young males with a poor assessment of the potential risk [36].

In the study conducted with the PWM, determinants of intention to refrain from hookah smoking were subjective norms, willingness, and attitude. There was also a relationship between the participants’ negative proto-
type about hookah smokers and the willingness to avoid hookah smoking [17, 31]. Therefore, designing interventions to increase negative prototypes about hookah smokers and reducing situations and conditions that facilitate hookah smoking, such as easy access to tobacco products in cafés, can be used to prevent hookah smoking [37].

A study conducted with the PMT indicates that perceived vulnerability, fear, self-efficacy, perceived intrinsic rewards, threat appraisal, and coping appraisal affect hookah use indirectly through intention, significantly associated with this behavior [29].

The results of a study based on the EPPM indicate that perceived susceptibility, perceived severity, and self-efficacy about hookah use consequences are more detected in hookah non-user students than hookah users [24]. Therefore, increasing perceived threats and strengthening the “saying no” skill significantly prevent hookah use. Indeed, self-efficacy and smoking refusal skills should be considered when developing tailored measures to avoid smoking hookah among adolescents [16].

The studies conducted without a model or theory showed the main factors affecting the use of hookah from the subjects’ point of view were socializing with friends, passing leisure time, entertainment, unemployment, feeling good, cost-effectiveness, reducing anxiety and fatigue, and easy access to hookah [18, 22, 25]. Adjusted for other factors, hookah use in the family, the social environment, regular cigarette smoking, and positive attitude toward smoking were associated with students’ transition to the hookah smoking status [20, 23]. Therefore, planning healthy activities for leisure time, learning to “say no,” educating the community and families, and teaching how to reduce anxiety and fatigue can decrease hookah smoking.

Among the demographic variables, gender (male), student educational status, friend’s hookah smoking, fathers’ education, household income, and tendency to hookah smoking had significant relationships with hookah use [27, 28]. Compared to non-users, hookah users evaluated a typical hookah user as a person who is more clever, less immature, more popular, more attractive, more self-confident, more independent, and less selfish in another study [19]. Therefore, these personality types can be inspirational for tobacco smoking. Currently, hookah is used in family gatherings or public places; some families are unaware of its hazards and do not objurgate it [38].

Most studies about hookah use have been conducted among adolescents and young people [39]. It is necessary to prevent hookah use in these high-risk populations. Adolescents and young people are more at risk because of their sense of independence, curiosity, and peer pressure; therefore, this period has always been one of the critical ages to study harmful behaviors [40, 41]. Family members and peers were essential in preventing hookah smoking among these students. They must be educated about the toxicity of hookah tobacco smoking and its direct effect on their health [41]. Studies have shown that education material tailored for target groups can help prevent hookah smoking [42, 43]. Interventional studies should also reduce the positive images about hookah smoking [44].

**Conclusion**

The synthesized evidence from this systematic review highlights the influence of social, cultural, and contextual factors on hookah smoking in Iran. These factors comprise unemployment, anxiety, fatigue, and easy access. Integrating the above factors in designing and implementing public health interventions might effectively prevent hookah use among Iranians. Therefore, it is suggested to conduct interventional studies to reduce the risk factors and underlying factors for hookah consumption based on the results obtained in the target groups.

**Ethical Considerations**

**Compliance with ethical guidelines**

There were no ethical considerations to be considered in this research.

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**Authors’ contributions**

All authors equally contributed to preparing this article.

**Conflict of interest**

The authors declared no conflict of interest.

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