Associations Between Hookah Tobacco Smoking Knowledge and Behavior Among Southern Technical University Students in Basra, Iraq

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ABSTRACT
The number of US college students using hookahs, including those who wouldn't normally use tobacco, is rising. The idea that hookah is safer than cigarettes is one factor contributing to its popularity. The study's objectives were to evaluate the degree of awareness about the negative exposures linked to hookah smoking as comparison to cigarette smoking and to identify any relationships between this knowledge and the consequences of hookah smoking. A random email sample of 400 Southern Technical University students was used to gather data on demographics, hookah smoking habits, and awareness of five exposures (such as nicotine and tar). Multivariable logistic regression models evaluated the independent relationships between knowledge and the results of hookah smoking. Out of the five questions about factual knowledge. Correct answers to any knowledge item in multivariable models did not correlate with a decreased likelihood of hookah smoking or susceptibility to smoking in the future. Despite the fact that most college students are not aware of the harmful exposures linked to hookah smoking, there is no correlation between awareness and hookah smoking behavior.

1. Introduction

In the United States, teenagers and young people are using hookahs—also called waterpipes or narghiles more frequently to smoke tobacco. Convenience and random sampling of college students show that 20–40% have ever used a hookah to smoke tobacco, and 5–20% have done so recently (within the last 30 days) (1-4). Furthermore, even if smoking cessation while college is common (5) , In fact, hookah use might rise throughout that same time period (6). Many people who consume hookah tobacco believe that there is little chance of injury or addiction from hookah smoking (3,4,10,11) , However, research indicates that it exposes users to high concentrations of carcinogens and toxicants. The World Health Organization, in actuality (12) estimates that the user of a hookah tobacco is exposed to almost 100 times the amount of smoke in a single cigarette during a single session. Additional studies verify that one hookah session is linked to significantly higher tar exposure than a single cigarette, Heavy metals and carbon monoxide (13-16) . These results are clear; for instance, an estimated 40 times more tar is present in a hookah smoking session than in a single cigarette (15,16) . Between 30% and 50% of college-aged hookah tobacco smokers do not also smoke cigarettes, indicating that many smokers are not otherwise exposed to the combustion products of tobacco (17-19) . While the exact nature of the correlation between smoking cigarettes and hookahs is still unknown, it is plausible that individuals who find hookahs to be socially enjoyable could eventually give cigarettes a try. Furthermore, the addictive substance nicotine found in hookah tobacco smoke may encourage more usage of cigarettes or other tobacco products. Among the factors contributing to hookah smoking's appeal, even among groups of people that would not normally consume tobacco, it could be due to ignorance of the harmful exposures connected to the habit (3) . 647 college students were randomly selected for a survey, and the results showed that in fully adjusted multivariable models, Low perceived harm was linked to a one-year waterpipe smoking exposure. and addictiveness in comparison to cigarette smoking. In alignment with the health belief paradigm that connects knowledge with behavior (20) , These findings imply that educational initiatives aimed at raising awareness of hookah tobacco use may be helpful in lowering hookah tobacco use. Nevertheless, no study has evaluated knowledge about particular exposures connected to hookah tobacco smoking directly to date. (such as tar, nicotine, and carbon monoxide) and how smoking hookah tobacco is influenced by this knowledge. The purpose of this study was (i) to determine whether Southern Technical University students were aware of certain toxicant

exposures linked to hookah tobacco use. and (ii) to identify the independent relationships between the results of using hookah tobacco (i.e., current use and susceptibility to future use) and this knowledge. Regarding the second objective, our presumptions, which were grounded on the health behavior model, were that correctly classifying a single hookah tobacco smoking session as having more tar When compared to a single cigarette, nicotine carcinogens , carbon monoxide , and heavy metals would be linked to lower odds for current hookah smoking. and decreased chances of being susceptible to smoking hookahs in the future. We also postulated that an increase in a person's general summary of toxicant exposures linked to a single hookah tobacco smoking session, would be linked to noticeably lower probabilities of both present hookah tobacco usage and susceptibility to future hookah tobacco use when compared to a single cigarette.

2. Methods

In 2023, this cross-sectional, descriptive study was carried out. A sample size consisting of 400 subjects was established for the study, taking into account the maximum permissible difference of 0.05 and $\alpha = 0.05$ based on previous research. the Southern Technical University contributed participants. First, the enrollment at each college was ascertained. Subsequently, 400 students were drawn at random from several colleges according to their respective student populations. Enrollment in Southern Technical University and willingness to engage in the study were prerequisites for inclusion in the research. Conversely, the criterion for exclusion involved an unwillingness to participate in the study. The study questionnaires were given to the participants and the necessary data were gathered once Southern Technical University approved the research project. The information was gathered via the survey utilized by. The questionnaire's reliability and validity had already been established.

3. Results And Discussion

table (1) the results reveal that most students are 18-22 years old (80.3%), followed by 23-27 years old (16.8%). The prevalence is higher in male (61.8%) than female (38.2%).fifty- five percent of students have a diploma and 45% hold bachelor

s degree . Rural residents make up 15.5% compared to 84.5% of urban residents. Most students (88.5%) live with family, while 11.5% live with classmates . About a third of respondents (32.5%) earn less than 500 thousand dinars, 45.3% earn 500 thousand to one million, and 22.3% earn more than one million. About 91.8% of respondents are single, with 8% married. Interestingly, 54.3% of respondents have smoker family members. In addition, the results demonstrate compared to 50.3% of non-smokers, 2.0% of females were smokers, while 98.0% of males were ($p < 0.001$). In addition, 72.0% of participants with a family smoker were smokers, compared to 48.3% of non-smokers ($p < 0.001$).

Table (1): Comparison between smokers and non-smokers according to Socio-demographic characteristics.

Socio-demographic characteristics	Hookah smoking status	P.

		Smokers		Non-smokers		Total		value
		No.	%	No.	%	No.	%	
Age groups	18-22 years	72	72.0	249	83.0	321	80.3	0.075
	23-27 years	23	23.0	44	14.7	67	16.8	
	28-32 years	4	4.0	4	1.3	8	2.0	
	33-37 years	1	1.0	3	1.0	4	1.0	
Gender	Female	2	2.0	151	50.3	153	38.2	<0.001
	Male	98	98.0	149	49.7	247	61.8	
Scientific level	Diploma student	53	53.0	167	55.7	220	55.0	0.642
	Bachelor's degree student	47	47.0	133	44.3	180	45.0	
Residence	Urban	85	85.0	253	84.3	338	84.5	0.873
	Rural	15	15.0	47	15.7	62	15.5	
Residence while studying	In the family home	91	91.0	263	87.7	354	88.5	0.366
	Shared with my colleagues	9	9.0	37	12.3	46	11.5	
Income	Less than 500 thousand dinars	33	33.0	97	32.3	130	32.5	0.060
	From 500 to one million dinars	37	37.0	144	48.0	181	45.3	
	More than one million dinars	30	30.0	59	19.7	89	22.3	
Marital status	Single	88	88.0	279	93.0	367	91.8	0.095
	Married	11	11.0	21	7.0	32	8.0	
	Other (widower or divorced).	1	1.0	0	.0	1	0.3	
Is there anyone in the family who smokes	Yes	72	72.0	145	48.3	217	54.3	<0.001
	No	28	28.0	155	51.7	183	45.8	

In table 2, 16.0% of smokers disagreed that "Smoke inhaled from hookah contains harmful chemicals," compared to 3.3% of non-smokers, with a p-value <0.001. For the belief that "Smoking hookah causes addiction," 24.0% of smokers disagreed compared to 7.3% of non-smokers, also with a p-value <0.001. With a p-value <0.001, 18.0% of smokers disagreed that hookah smoking causes cancer, compared to 4.0% of non-smokers. Finally, 12.0% of smokers disagreed with "Smoking a hookah may cause heart disease," compared to 4.7% of non-smokers (p= 0.003). On the statement "Hookah smoking may harm foetuses during pregnancy," 17.0% disagreed, 5.7% were unsure, and 50% agreed (p = 0.001). When asked if hookah smoke has more tar than cigarette smoke, 39.0% are unsure, 49.0% agree, and 12.0% disagree (p = 0.330). Most (52.0%) disagree that hookah smoke has more nicotine than cigarette smoke, with a smaller percentage unsure (18.0%) and agreeing (52.0%).

For the belief that hookah smoke contains more carcinogenic substances or heavy metals than cigarette smoke, 23.0% and 18.0% disagree, while 42.0% and 43.0% agree (p = 0.001 for carcinogens, p = 0.025 for heavy metals). In addition, 64.0% of respondents agree that hookah smoking harms non-smokers exposed to it, while 20.0% disagree (p = 0.008).

Table (2): Comparison between smokers and non-smokers according to Know the health effects associated with hookah smoking.

Know the health effects associated with hookah smoking		Hookah Smoking Status						P. value
		Smokers		Non-smokers		Total		
		No.	%	No.	%	No.	%	
Smoke inhaled from hookah contains harmful chemicals	Disagree	15	15.0	10	3.3	25	6.3	<0.001
	I don't know	20	20.0	39	13.0	59	14.8	
	Agree	65	65.0	251	83.7	316	79.0	
Smoking hookah causes addiction	Disagree	24	24.0	22	7.3	46	11.5	<0.001
	I don't know	1	1.0	23	7.7	24	6.0	
	Agree	75	75.0	255	85.0	330	82.5	
Hookah smoking may causes various types of cancer (lung, mouth, throat, etc.)	Disagree	18	18.0	12	4.0	30	7.5	<0.001
	I don't know	20	20.0	24	8.0	44	11.0	
	Agree	62	62.0	264	88.0	326	81.5	
Smoking a hookah may cause heart disease	Disagree	12	12.0	14	4.7	26	6.5	0.003
	I don't know	17	17.0	29	9.7	46	11.5	
	Agree	71	71.0	257	85.7	328	82.0	
Hookah smoking may cause infertility in men who smoke	Disagree	40	40.0	45	15.0	85	21.3	<0.001
	I don't know	26	26.0	129	43.0	155	38.8	
	Agree	34	34.0	126	42.0	160	40.0	
Hookah smoking may harm fetuses during pregnancy	Disagree	17	17.0	17	5.7	34	8.5	0.001
	I don't know	33	33.0	91	30.3	124	31.0	
	Agree	50	50.0	192	64.0	242	60.5	
Hookah smoke contains more tar than cigarette smoke	Disagree	12	12.0	25	8.3	37	9.3	0.330
	I don't know	39	39.0	139	46.3	178	44.5	
	Agree	49	49.0	136	45.3	185	46.3	
Hookah smoke contains more nicotine than cigarette smoke	Disagree	30	30.0	34	11.3	64	16.0	<0.001
	I don't know	18	18.0	111	37.0	129	32.3	
	Agree	52	52.0	155	51.7	207	51.7	
Hookah smoke contains more carcinogenic substances than cigarette smoke	Disagree	23	23.0	31	10.3	54	13.5	0.001
	I don't know	35	35.0	93	31.0	128	32.0	
	Agree	42	42.0	176	58.7	218	54.5	
Hookah smoke contains more heavy metals than cigarette smoke	Disagree	18	18.0	25	8.3	43	10.8	0.025
	I don't know	39	39.0	135	45.0	174	43.5	
	Agree	43	43.0	140	46.7	183	45.8	

Hookah smoking harms non-smokers who are exposed to hookah smoke	Disagree	20	20.0	26	8.7	46	11.5	0.008
	I don't know	16	16.0	50	16.7	66	16.5	
	Agree	64	64.0	224	74.7	288	72.0	

Table (3) represent the relationship between the total knowledge score and socio-demographic characteristics. The results found that there is no significant association between the total knowledge score and socio-demographic characteristics (P. value >0.05), Except for females' sex have a positive association with the knowledge (P. value <0.001). Also, those who have income from 500 to one million dinars have good knowledges (P. value = 0.041).

Table (3): The relationship between the total knowledge score and socio-demographic characteristics.

		Total Knowledge Score						**P. value**
		Poor (<22 score)		**Fair (22-27 score)**		**Good (>27 score)**		
		No.	**%**	**No.**	**%**	**No.**	**%**	
College	College of Health and Medical Technologies	0	.0	5	17.9	23	82.1	0.174
	College of Engineering Technology	7	7.4	35	36.8	53	55.8	
	College of Administrative Technology	7	12.3	16	28.1	34	59.6	
	Basra Technical Institute	21	9.5	66	30.0	133	60.5	
Age groups	18-22 years	23	7.2	96	29.9	202	62.9	0.175
	23-27 years	10	14.9	24	35.8	33	49.3	
	28-32 years	1	12.5	2	25.0	5	62.5	
	33-37 years	1	25.0	0	.0	3	75.0	
Gender	Female	4	2.6	32	20.9	117	76.5	<0.001
	Male	31	12.6	90	36.4	126	51.0	
Scientific level	Diploma student	21	9.5	66	30.0	133	60.5	0.818
	Bachelor's degree student	14	7.8	56	31.1	110	61.1	
Residence	Urban	30	8.9	97	28.7	211	62.4	0.186
	Rural	5	8.1	25	40.3	32	51.6	
Residence while studying	In the family home	33	9.3	106	29.9	215	60.7	0.481
	Shared with my colleagues	2	4.3	16	34.8	28	60.9	
Income	Less than 500 thousand dinars	11	8.5	49	37.7	70	53.8	0.041
	From 500 to one million dinars	18	9.9	41	22.7	122	67.4	
	More than one million	6	6.7	32	36.0	51	57.3	

	dinars							

Among a random sample of college students, we discovered a significant knowledge gap: the great majority of students were ignorant of the toxic load connected to hookah tobacco use. The substantial ignorance of hookah toxicant exposures found in this study is in line with findings from previous studies. Studies demonstrate that the majority of students believe smoking hookah tobacco to be less addictive or dangerous than smoking cigarettes (3, 4, 10, 11). But we also discovered that there wasn't much of a correlation between outcomes related to hookah tobacco smoking and accurate or inaccurate knowledge. in contrast to the predictions made by the health belief model. The accurate determination that a single hookah tobacco smoking session contained more levels of tar, nicotine, carcinogens, carbon monoxide, and heavy metals than a single cigarette did not correlate with a decreased likelihood of hookah smoking at the time in question. or decreased likelihood of being susceptible to hookah smoking in the future . Furthermore, no significant correlation was found between summary knowledge and either susceptibility to use hookah tobacco in the future or current hookah tobacco usage . While there is no evidence of a connection between knowledge and hookah tobacco usage, prior research has shown that active hookah users are more likely than non-users to believe that hookah smoking is less addictive or dangerous than smoking cigarettes (3, 11, 21). The reason for the apparent disparity between knowledge and perception findings could be that an individual's broad knowledge does not always correspond to a notion that they are personally more susceptible to harm (22) . Individuals often overestimate the hazards to their own health; for instance, prior studies have demonstrated that smokers of cigarettes tend to overestimate their own risk of disease even when they are aware of the true risks (23, 24) . These findings imply that, even though our study shows a clear knowledge gap, closing this gap could not have a major impact on the use of and susceptibility to hookah tobacco. It's interesting to note that responding "don't know" to numerous knowledge items was linked to much "lower" likelihood of either hookah tobacco smoking currently or being susceptible to it in the future. According to the bivariable analysis, there was a mixed pattern of people who weren't vulnerable to hookah smoke or who answered "don't know," with both groups properly answering around the same amount of times. However, in multivariate analysis, there was no discernible difference in the number of wrong responses between those who smoked hookah tobacco and those who did not. This study's cross-sectional design restricts our capacity to draw conclusions about causality. People who have been exposed to or have an interest in hookah tobacco may be more certain though not always correct in their knowledge of smoking hookah tobacco, which may reduce the likelihood that they will answer "don't know." Determining the directionality of the correlations between knowledge and hookah tobacco smoking outcomes in longitudinal samples will be a valuable task . Nevertheless, the lack of a correlation between the right or wrong responses to knowledge questions and the smoking of hookah tobacco implies that greater information is not a potent discourager of hookah tobacco use. In addition to the health belief model, various theoretical frameworks may be useful to help understand the mechanisms behind hookah tobacco smoking, given the lack of relationship between correct knowledge and the effects of smoking. For instance, more positive attitudes toward and normative ideas surrounding a behavior improve the likelihood of intending to perform, and eventually performing, a given activity, according to the theory of reasoned action, which is frequently used to describe youth tobacco use (25) . Actually, a lot more effective cigarette-related antismoking programs emphasize the negative effects of tobacco use rather than the favorable expectations that teenagers have for smoking (26, 27) . Future research could benefit from examining relationships between normative views, positive attitudes, and hookah smoking behavior. It might be more successful for anti-hookah tobacco smoking initiatives to change public policy and counteract favorable attitudes regarding hookah smoking rather than just informing students about the dangers.

4. Conclusion

In conclusion, college students' understanding of the exposure to toxins linked to hookah tobacco use

was definitely lacking, but there was little correlation between this information and results of smoking hookah tobacco in our investigation.Our research indicates that, while educational interventions may eventually be beneficial, they might not have a significant impact on key hookah tobacco smoking behaviors if the only goal is to increase knowledge of toxicant exposures. Rather, a comprehensive strategy that tackles attitudes and environmental elements alongside information, akin to the successful approach employed to tackle tobacco smoking, might prove to be more efficacious.

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