

Waterpipe Tobacco Smoking among Iranian Adults During COVID-19 Pandemic

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Received: 02 October 2022

Revised: 17 November 2022

Accepted: 10 December 2022

Abstract

Background: In the early days of the pandemic, the rise in COVID-19 cases prompted many governments to lockdown the waterpipe-serving venues, which may affect the patterns of use among this centuries-old tobacco product. Here, we studied the pattern of WP smoking among Iranian adults during the COVID-19 epidemic.

Methods: In this cross-sectional study, we conducted an online survey among sample of 213 waterpipe(WP) smokers who were selected by convenience sampling method from the Golestan province, in Northern Iran using WP smoking patterns, Lebanese Waterpipe Dependence Scale, 11 (LWDS11), and selected demographic variables. Collected data comprises demographic and WP smoking patterns during COVID-19.

Results: About 70% of participants reduced their WP use compared to the time before COVID-19, modestly due to pandemic effects. Around 38.5% of the subjects believed WP bars were covertly operating during the lockdown and continued serving their customers. Singles and less educated adults had lower mean attitude scores regarding the decrease in WP smoking during the COVID-19 pandemic ($P < 0.05$). Structural equation analysis revealed that the immune system improvement with WP smoking had the strongest effect. (0.74). A strong inverse correlation exists between the WP dependence level and the negative belief toward WP smoking during the COVID-19 epidemic ($r = -0.66$, $P < 0.001$).

Conclusion: There is a clear need for appropriate interventions to change the belief of WP smokers regarding the dangers of this practice during the COVID-19 outbreak, particularly among single people and those with lower levels of education. Furthermore, regulatory authorities should exercise stricter controls to ensure the complete closure of WP bars.

Please cite this article as: Rajabi A, Ebrahimi Kalan M, Shahryari A, Ahmadi-Livani M, Foroughi A, Jorjani T, Fazlzadeh M, Ben Taleb Z, Charkazi A. Waterpipe Tobacco Smoking among Iranian Adults During COVID-19 Pandemic. *J Health Sci Surveillance Sys.* 2023;11(Supplement 1):218-225.

Keywords: COVID-19, Iran, Pandemics, Water Pipe smoking

Introduction

Lung damage due to tobacco smoking (e.g., waterpipe (WP) and cigarette) makes smokers more susceptible to bacterial and viral infections.¹ Studies indicate that smokers are more prone to respiratory diseases like bacterial pneumonia and tuberculosis than non-smokers.²⁻⁴ In a scientific brief on June 2020, the World Health Organization concluded that the available evidence

suggests that smoking is associated with increased disease severity and death in hospitalized COVID-19 patients.⁵ The results of various Iranian studies show that the prevalence of smoking varies between 3.6% to 22%.^{6,7} As of December 12 2022, approximately 269 million confirmed cases and nearly 5.3 million deaths had been reported around the globe.⁸ In the early months of the COVID-19 pandemic, traditional restaurants and WP bars where could act as potential foci for the

transmission of COVID-19 were closed by the decree of the Ministry of Health to help control the spread of this infection. Earlier attempts to curb the use of WP in Iran had been largely unsuccessful, and it was anticipated that the order to shut down WP-serving venues would meet with opposition from the owners of these places as it was affecting their business at the time of the pandemic. Simultaneously, the closure of these venues could lead to unknown changes in the pattern of WP use among its users who are already hooked on nicotine, and living without WP would have been a hard circumstance for them. There is little evidence about WP smoking patterns and beliefs during the COVID-19 pandemic.⁹ Therefore, to expand the literature and fill this gap, we mapped an online survey to determine patterns of WP use among adults in Golestan Province, a region of Iran with a high rate of WP smoking prevalence.

Methods

Study Design, Sample, and Procedure

In this cross-sectional study, we used an online survey to collect data on sociodemographics, WP use patterns, and belief about using WP during the COVID-19 pandemic in the first three weeks of May 2020. We disseminated the study questionnaire among 250 adults WP smokers who were chosen by convenience sampling method using several online platforms (e.g., Telegram) in line with the previous study.⁹ Of those, 213 WP smokers completed the electronic questionnaires of the study. The study's time span comprised the first three weeks of May 2020. The questionnaire was made available to potential participants through groups and channels on social networks on the internet. They were further asked to share it with friends, family, and acquaintances who were WP smokers. The Institutional Review Board approved the study protocol at the Golestan University of Medical Sciences and the National Committee of the Ethics in Biomedical Research under the registration number IR.GOUMS.REC.1399.033.

Measures

Data Were Collected Using four Modules

1- Sociodemographic included age (<30 vs. ≥30 years), sex (male vs. female), education (elementary, high school, some college, college graduate), and occupation (staff, self-employed, unemployed, student, housewife).

2- WP smoking patterns were collected using literature.^{10, 11} This module included questions on items such as the number of times the respondent has smoked WP during the past month, the setting in which the respondent smokes WP (alone at home or in the traditional cafes), and age at WP smoking initiation.

3- To measure nicotine dependence, we use

Lebanese Waterpipe Dependence Scale, 11 (LWDS11), which has already been validated among the Iranian population.^{12, 13} This scale is an 11-item measurement that primarily assesses physical dependence and smoking motivation. The cut-off point of 10 satisfactorily separates light, moderate, and heavy WP dependency. The potential score ranges from 0 to 33. The higher the score, the more dependent the person is on WP. It includes four factors: I) physiological dependence (4-item), like the number of times you could stop waterpipe for more than seven days. II) negative reinforcement(2-item), “ You smoke waterpipe to relax your nerves.”, III) psychological craving(3-item)” Do you smoke waterpipe when you are seriously ill?, and IV) positive reinforcement(2-item)” You smoke waterpipe for pleasure.

4- The pattern of WP use and beliefs related to WP smoking and COVID-19 were collected using a module comprised of 24 items (e.g., the pattern of WP use during the COVID-19 epidemic, the setting of WP smoking, the state of the operation of traditional cafes (open or closed), adherence to social distancing and smoking WP during the lockdown and home quarantine, and whether WP users get infected by COVID19 (beliefs) rapidly. The beliefs included 8-Item. Participants should answer the Items based on a 5-point Likert scale from completely disagree (score 1) to completely agree (score 5).

Data Analysis

Data obtained in this study were entered in STATA statistical software, version 14, and descriptive statistics (mean, standard deviation, percent, and frequency) for the data were presented. First, the beliefs about WP smoking during the COVID-19 pandemic were compared among the categorical variables (beliefs) through an independent sample t-test and one-way Analysis of Variance (ANOVA). Next, the effect of each item of the beliefs was assessed using confirmatory factor analysis and structural models.. Furthermore, structural models were created for each item about WP dependency.

Moreover, it was assessed according to various factors of WP dependence, including physiological dependence, negative reinforcement, psychological craving, and positive reinforcement, and each item significantly predicted the corresponding factor. The factor score was calculated for each item in all these factor analyses. A chi-square test was used to evaluate the congruency between the hypothesized model and empirical data. In addition, other model fit indices were used: comparative fit index (CFI; 0.95 or above indicative of good fit), Tucker Lewis index (TLI; 0.95 or above indicative of good fit), average absolute standardized residuals (0.05 or less indicative of good fit), and root mean square error of approximation (RMSEA; 0.05 or less indicative of good fit). Finally,

we used SEM to examine the correlation between subscales of waterpipe dependence. The significance level was set at less than 0.05 in all analyses.

Results

Of the 250 participants who were invited to participate in this survey during the COVID-19 pandemic, data from 213 WP smokers were included in the analysis. Of the 213 participants, 158 (74.18%) were men, and their mean age was 30.24±7.54 (14-57) years, with over 50% attaining education above the undergraduate level and mostly self-employed. Table 1 shows other demographic characteristics.

Our findings showed that more than 60 % of participants had smoked WP more than 50 times during their lives. It is noteworthy that 24.88% of the subjects had not smoked WP in the past month, with the mean age for WP use imitation as 20.88±6.07 (12-53) years (Table 2).

More than 65% of the participants stated that their WP use had decreased compared to the time before the pandemic posing this pandemic as the main reason for this WP use reduction (61.06%). Most of those subjects that continued smoking during the pandemic did so in the company of friends (38.97%). Surprisingly, 38.5% of participants stated that owners of WP-serving venues or bars stealthily operated their establishments. More than 36% of participants

adhered to quarantine restrictions (Table 3).

Furthermore, the study of the structural belief toward waterpipe smoking reduction during the epidemic showed that the mean score of the belief was 27.77±5.34 out of 40. Structural analysis of the belief revealed that all the items related to the belief significantly affected the prediction of the belief variable, and the item of the strengthening the immune system with WP smoking had the strongest effect (0.74). The structural model fit was fully achieved (Figure 1 and Table 4). While WP smoking reduction during the pandemic was not significantly different between women and men (P=0.87), it was significantly higher among singles than married individuals (P=0.01). Moreover, the mean score of the belief toward WP smoking reduction during the pandemic significantly decreases with higher levels of education (P=0.007). Table 5 shows details of this analysis. More than half of the participants (56.3%) mentioned that low and limited WP use prevents COVID-19 infection, while 22.1% have mentioned that it is ineffective.

In another structural analysis, the correlation between the level of WP dependence and the belief toward WP smoking reduction in the COVID-19 epidemic conditions was assessed, and the results showed a strong inverse relationship between the level of WP dependence and the belief toward waterpipe smoking reduction in the COVID-19 epidemic

Table 1: Demographic characteristics of study sample (N=213)

Variable	N (%)
Total	213 (100)
Gender	
Male	158 (74.18)
Female	55 (25.82)
Age (Mean±SD, Min-Max)	30.24±7.54 (14-57)
<30	125 (58.69)
≥30	88 (41.31)
Marital status	
Married	91 (42.72)
Unmarried	106 (49.77)
Divorced	16 (7.51)
Education level	
Elementary	18 (8.45)
High school	61 (28.64)
Some College	23 (10.80)
College graduated	111 (52.11)
Employment job	
Staff	56 (26.42)
Self-employed	94 (44.34)
Unemployed	16 (7.55)
Student	31 (14.62)
Housewife	15 (7.08)
Age of onset of waterpipe tobacco use (Mean±SD) (Min-Max)	20.88±6.07 (12-53)
<20	133 (63.03)
≥20	78 (36.97)

N: Number; %: Percent; SD: Standard deviation; Min: Minimum; Max: Maximum

Table 2: Pattern of waterpipe tobacco use among waterpipe user in Golestan province, Iran (n=213)

Pattern	N (%)
Frequency of waterpipe tobacco use during whole life	
Once	6 (2.82)
2-5 times	8 (3.76)
6-25 times	28 (13.15)
26-50 times	39 (18.31)
50+ times	132 (61.97)
Frequency of waterpipe tobacco use in the previous month	
0 time	53 (24.88)
1-2 times	48 (22.54)
3-5 times	33 (15.49)
6-9 times	33 (15.49)
10-15 times	11 (5.16)
16-20 times	35 (16.43)
Current waterpipe tobacco use pattern	
At least once a year but not every month	41 (19.25)
At least once a month but not every week	72 (33.80)
At least once a week but not every day	59 (27.70)
At least once a day and most days a week	41 (19.25)
Duration of waterpipe tobacco use	
< 6 months	37 (17.37)
6 months to 1 year	17 (7.98)
1-< 2 years	24 (11.27)
2-< 3 years	20 (9.39)
3-< 4 years	34 (15.96)
≥ 4 years	81 (38.03)

Table 3: Pattern of waterpipe tobacco use among waterpipe user in the epidemic conditions of COVID-19 Golestan province, Iran (n=213)

	N (%)
After the COVID-19 outbreak, how much has your waterpipe tobacco use changed compared to before that?	
Not changed	8 (3.76)
Increased	65 (30.52)
Decreased	140 (65.73)
Reasons for reducing waterpipe tobacco use	
Corona pandemic	69 (61.06)
Closed coffee house	23 (20.35)
For health	21 (18.58)
Waterpipe use place after the epidemic Corona	
At home alone	69 (32.39)
At home with family	34 (15.96)
At friends' house	83 (38.97)
At coffee house	27 (12.68)
Do you waterpipe use in the presence of children?	
Yes	46 (21.60)
No	120 (56.34)
Sometimes	47 (22.07)
Coffee house were stealthy opened	
Yes	82 (38.50)
No	92 (43.19)
Sometimes	39 (18.31)
Did you share the waterpipe hose with others during Corona's outbreak?	
Not at all	126 (59.15)
Rarely	37 (17.37)
Sometimes	26 (12.21)
Often	13 (6.10)
Always	11 (5.16)
Did you follow home quarantine during this time?	
I not complied at all	9 (4.23)
I seldom complied	25 (11.74)
I complied some extent	60 (28.17)
I often complied	77 (36.15)
I always complied	42 (19.72)
Did you break your home quarantine because of waterpipe use?	
Not at all	121 (56.81)
Rarely	34 (15.96)
Sometimes	40 (18.78)
Often	12 (5.63)
Always	6 (2.82)

N: Number; %: Percent

conditions ($r=-0.66$, $P<0.001$) (Figure 2).

Of the 213 participants, 44.5% believed that the attractiveness of WP smoking has diminished for them because of the closing of WP bars due to COVID-19 (Table 6). Moreover, 53 percent believed the nicotine in WP cannot prevent COVID-19, and 64% believed COVID-19 transmitted rapidly among WP smokers. Furthermore, 58 percent believed that waterpipe smokers are prone to contracting COVID-19, while 20 percent rejected this view.

Among our study participants, 61% refuted the belief that waterpipe boosts the smokers' immune system and prevents COVID-19, while around 19% concurred with this belief. In addition, more than 50% of participants rejected the belief that using disposable hoses/mouthpieces prevent the transmission of COVID-19, and 68% agreed that the lung of WP smokers is more susceptible to COVID-19.

Discussion

The results of this study revealed a decrease in WP smoking patterns in 65% of the participants during the COVID-19 pandemic. The participants in the study indicated the COVID-19 pandemic as the main reason for this decrease (61.66%). This finding suggests that the fear of contracting COVID-19 has caused people to observe social distancing and home quarantine; consequently, their use of WP has decreased. It should also be noted that WP smoking is usually a social phenomenon, practiced in friendly get-togethers, mostly in cafes and waterpipe WP bars collectively and as a pastime.^{14, 15, 16} Some participants also cited the fear for their safety as the reason for this decrease. But in around one-third of the people under study, WP smoking has increased during this period, and in a very small number, it has remained unchanged. However, there are diverse findings regarding smoking during the pandemic. In their study, Kowitt et al., found that 40.9% reported increased smoking while 17.8% reported decreasing their smoking use after the COVID-19 pandemic.¹⁷

The people who continued smoking WP during the corona epidemic did so mostly in the company of their friends or at home, alone or with family members. The

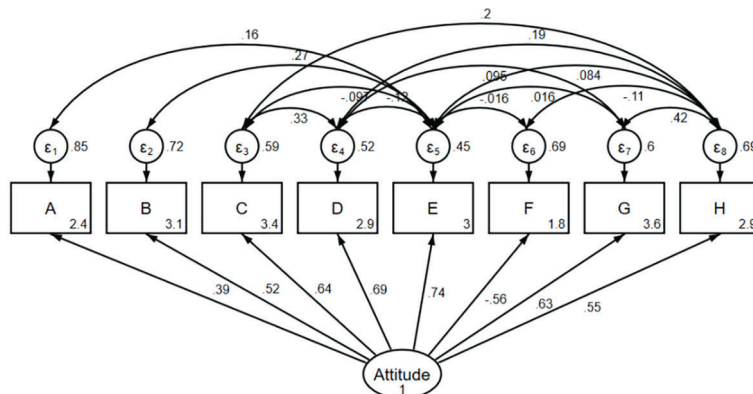


Figure 1: The results obtained from the confirmatory factor analysis for belief.

Table 4: Comparison of belief towards reducing waterpipe tobacco use according to demographic variables (n=213)

	Attitude (Mean±SD) (Min-Max)	P value
Gender		
Male	27.81±5.20 (14-39)	0.87
Female	27.67±5.77 (17-39)	
Age		
<30	27.97±5.43 (14-39)	0.51
≥30	27.48±5.23 (16-38)	
Marital status		
Married	26.89±5.32 (16-38)	0.01
Unmarried	29.03±5.16 (14-39)	
Divorced	26.43±5.32 (17-35)	
Education level		
Elementary and middle school	24.72±4.95 (18-35)	0.007
High school & Diploma	26.29±5.79 (14-38)	
Junior College	28.21±3.80 (17-34)	
Bachelor & higher	28.99±5.07 (17-39)	
Employment job		
Staff	29.51±4.67 (19-38)	0.002
Self-employed	26.78±5.02 (14-36)	
Unemployed	26.81±7.35 (14-39)	
Student	29.41±4.93 (18-39)	
Housewife	25.13±5.99 (17-36)	
Age of onset of waterpipe tobacco use		
<20	27.50±5.47 (14-39)	0.33
≥20	28.24±5.16 (17-38)	

N: Number; %: Percent, SD: Standard deviation

Table 5: Frequency of belief regarding waterpipe use and prevention of COVID-19

Items	Strongly disagree N (%)	Disagree N (%)	Neither agree nor disagree N (%)	Agree N (%)	Strongly agree N (%)
1. Due to the prevalence of COVID-19 and the closure of cafeterias, the attractiveness of WP use has decreased for me.	30 (14.08)	27 (12.68)	62 (29.11)	41 (19.25)	53 (24.88)
2. I think the nicotine in WP prevents COVID-19.	93 (43.66)	20 (9.39)	72 (33.80)	19 (8.92)	9 (4.23)
3. COVID-19 transfer speeds are high for WP consumers.	9 (4.23)	22 (10.33)	46 (21.60)	71 (33.33)	65 (30.52)
4. WP people are more likely to get COVID-19.	15 (7.04)	29 (13.62)	45 (21.13)	67 (31.46)	57 (26.76)
5. In my opinion, WP strengthens the immune system and is effective in preventing COVID-19.	94 (44.13)	36 (16.90)	43 (20.19)	30 (14.08)	10 (4.69)
6. Because traditional coffee shops and cafeterias use disposable hoses, COVID-19 transmission is prevented.	86 (40.38)	38 (17.84)	44 (20.66)	37 (17.37)	8 (3.75)
7. WP consumers lungs are more vulnerable to COVID-19	9 (4.23)	15 (7.04)	43 (20.19)	78 (36.62)	68 (31.92)
8. The WP consumers' immune system is weaker and more prone to COVID-19	16 (7.51)	27 (12.68)	63 (29.58)	61 (28.64)	46 (21.6)

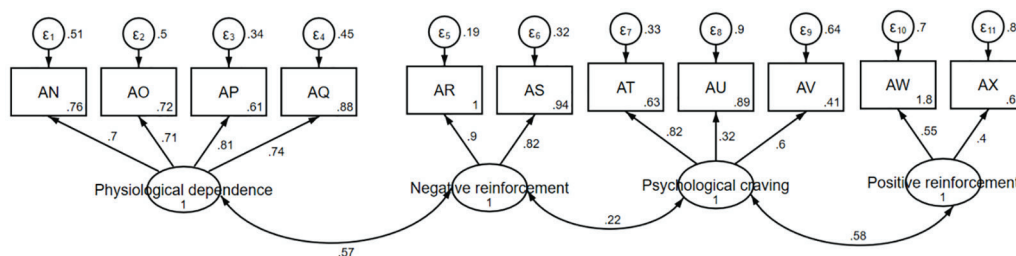


Figure 2: The results obtained from the confirmatory factor analysis for factors WP dependence scale.

closing of WP bars has forced these people to change the pattern and setting of their WP use, but on the other hand, around 13 percent of the participants stated that they continued smoking WP in bars or cafés. This issue is noteworthy because half the participants have

mentioned that WP bar owners continued to operate their establishments surreptitiously and served WP to a selected group of patrons. It could be argued that the financial hardship and constraints experienced by WP bar proprietors have drawn them to this act

Table 6: The confirmatory factor analysis of the attitude (n=213)

	Fit indices attitude	Fit indices figure 3
χ^2/df	12.02	8.02
RMSEA	0.05	0.05
GFI	0.95	0.95
CFI	0.99	0.96
SRMR	0.03	0.04

χ^2/df : Relative chi-square; RMSEA: Root mean square error of approximation; GFI: Goodness of fit index; CFI: Comparative fit index; SRMR: Standardized root mean squared residual

and enticed them to flout the quarantine restrictions imposed by the health authorities, as they require financial support for these small businesses to increase their compliance concerning retractions and lockdown to curb pandemic and prevent more cases of COVID19 infection.

Concerning the beliefs toward WP smoking at the time of COVID-19, results indicate that a considerable number of the subjects believe that, in general, WP smokers are more susceptible to contracting COVID-19. When asked more specifically, they stated that the nicotine in WP does not prevent COVID-19 infection-which was suggested earlier in the pandemic-and that the immune system of WP smokers is weaker and is more prone to disease. A study in Iran revealed that almost half of participants believed waterpipe smoking could spread COVID-19 infection.⁹ They believe that WP smoking does not strengthen the immune system and the smokers' lungs are more vulnerable to coronavirus. These findings show that a partial perceived threat of COVID-19 transmission risk through WP smoking exists among the users, although in a few isolated cases, false, exaggerated beliefs about WP are detectable that should be corrected through appropriate interventions.

One interesting aspect of these findings is that for a considerable number of people, the attractiveness of WP smoking has diminished because of the closing of WP bars. This finding can be due to the fact that smoking WP is a social phenomenon, and people enjoy it most in cafe settings, with their friends, and in get-togethers rather than in a solidarity manner that is usually observed in cigarette smokers.¹⁸⁻²¹

More than half the people under study demonstrated reasonable belief on the issue of the rapid transmission of COVID-19 while smoking WP together. They also believed that WP smokers' lungs are susceptible to the disease, and smoking WP does not strengthen the immune system. On the other hand, a considerable number regarded WP smoking as a preventive measure against COVID-19. This false belief necessitates the implementation of comprehensive educational interventions to eradicate it. Study results indicated that waterpipe smokers compared with non-smokers were more likely to believe that smoking waterpipe could lead to rapid recovery (aOR=29.98, 95% CI 4.15–216.55).⁹ These people should be taught that WP not only does not

confer any protection against COVID-19 but can also put smokers at a higher risk of contracting the disease than other members of society. Results of some studies have shown that smokers have a higher probability of contracting the common cold, Influenza, and SARS viruses compared to non-smokers.^{1-5, 22}

One of the other interesting results of this study was the finding that the mean score of belief toward reducing WP smoking in the time of the COVID-19 epidemic was higher among the subjects with a higher degree of dependency on the WP nicotine, probably meaning that people with a high dependency feel a stronger desire for smoking in the time of the pandemic, and it is hard for them to abstain from smoking WP. This finding justifies the previous evidence that nicotine in WP smoking induces dependence in these individuals, creating a temptation toward using WP, which can present itself even in the form of breaking the home quarantine.

The present study had certain limitations. Firstly, the study was conducted online, cross-sectionally, using self-reporting tools. These factors complicate the task of discovering causative relationships. Secondly, the sample under study was limited to the members of social networks, such as Telegram and WhatsApp, and did not include other people, making it difficult to generalize the findings. However, an online survey can translate into staffing efficiencies, lower research costs, and allow data to be gathered in real-time, under real-world conditions, thereby enhancing the validity of its findings.²³

Conclusion

To sum up, a strong and inverse relationship exists between the dependence on waterpipe and the belief toward waterpipe smoking under the conditions of the COVID-19 epidemic. The effect of waterpipe smoking on the body's immune system and its ability to prevent COVID-19 was the most influential factor. Therefore, it is clearly indicated to implement the necessary measures to change the users' belief on the waterpipe smoking risks in the COVID-19 pandemic, particularly among single and less educated people.

Acknowledgment

The authors wish to warmly thank the study participants and register their acknowledgment to the vice-dean for

research and technology of the Golestan University of Medical Sciences for supporting othis study financially.

Conflict of interest: None declared.

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