

## Waterpipe Smoking in Pregnant Women of Zahedan City in 2020: Prevalence and Associated Factors

### Abstract

**Background:** Waterpipe smoking is associated with maternal and fetal complications, and valid data contribute to evidence-based planning. This study was conducted to determine the prevalence and factors related with waterpipe smoking among pregnant women of Zahedan city in 2020. **Methods:** This cross-sectional study was conducted in 2020, and 400 pregnant women in the third trimester of pregnancy who lived in Zahedan participated in it by single stage randomized cluster sampling. A questionnaire was used to measure awareness of waterpipe complications, and another one investigated the status of waterpipe smoking to collect data. For data analysis, descriptive statistics and multiple logistic regression were used through SPSS 21. **Results:** The findings indicated that the prevalence of waterpipe smoking was 18.8%. In the waterpipe smoking group, 46.6% smoked every day, 89.3% had tried to reduce the smoking, and 64.8% reported fetal death as their main motivation to reduce smoking. Only 5.6% of subjects stated receiving training as the reason for reduction of their waterpipe smoking. The women's level of education, economic status, ethnicity, and awareness of the risks of waterpipe smoking were the predictors for waterpipe smoking ( $P < 0.05$ ,  $P = 0.03$ ,  $P = 0.006$ , and  $P < 0.001$ , respectively). **Conclusions:** The results of this study show the high prevalence of waterpipe smoking in pregnant women of Zahedan. Further investigation and training in this regard are essential for pregnancy as well as pre-pregnancy care. Special attention should be paid to groups with better economic status and level of education, Baluch women, and those with low level of awareness.

**Keywords:** Iran, pregnancy, prevalence, tobacco, waterpipe smoking

### Introduction

Recently, the prevalence of waterpipe tobacco smoking has increased among young women of Middle Eastern countries,<sup>[1]</sup> and this smoking has become an acceptable cultural norm in many countries.<sup>[2]</sup> In Iran, 17% of women and 6% of men prefer waterpipe tobacco smoking,<sup>[3]</sup> and women's tendency toward waterpipe tobacco smoking increased by 75% between 2009 and 2014.<sup>[4]</sup> This has caused waterpipe smoking to become one of the most popular leisure activities among women.<sup>[5]</sup> The prevalence of waterpipe smoking among women living in Tehran (2010) and Kerman is 6.3%<sup>[3]</sup> and 30%,<sup>[6]</sup> respectively.

Smoking tobacco in women is of high importance because of maternal and fetal complications such as fetal death, stillbirth, abortion, low birth weight, sudden infantile death syndrome, and placental anomalies.<sup>[2,7]</sup> Studies show that

in addition to these complications, birth defects, non-Hodgkin's lymphoma, Down's syndrome, obesity, and overweight increase among the children of these women.<sup>[8,9]</sup> The results of a prospective study in Isfahan have indicated that pregnancy complications including preeclampsia, preterm labor, abortion, low birth weight, and low Apgar score are more prevalent among waterpipe smoking pregnant women compared with other women.<sup>[10]</sup> The mechanism of tobacco's effect is possibly diminished ability of oxygen transfer to the fetus because of nicotine and carbon monoxide interactions. Furthermore, free radicals increase in both the smoking mother and fetus. These free radicals are considerably reactive and randomly attack various cellular molecules, which can cause DNA damage.<sup>[8]</sup>

Also, maternal smoking during pregnancy leads to a variety of long-term behavioral and neurodevelopmental disorders for the baby, threatening its long-term health as well as human capital. High rate of infection and

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respiratory problems in children are among the complications of maternal waterpipe smoking. Early physical problems caused by smoking negatively affect human capital throughout a person's life. For example, low birth weight infants have lower academic achievement, lower grades, fewer school years, more dropouts, lower economic performance, lesser incomes, and more poverty in the future.<sup>[11]</sup>

Limited studies have dealt with investigating the prevalence of waterpipe smoking during pregnancy. In a study by Nematollahi, during 2016 to 2018, the prevalence of waterpipe smoking among women living in Bandar Abbas was 8.2%, whereby no significant difference was observed between waterpipe smoking and non-smoking women in terms of age, level of education, occupational status, and number of family members.<sup>[12]</sup> Moreover, in a study performed in Jordan, it was estimated that 8.7% of pregnant women smoke waterpipe. The results indicated that there was no significant difference between waterpipe smoking and non-smoking women regarding age, income, place of residence, and education level. Income and age were predictors of waterpipe smoking.<sup>[8]</sup> Considering the women's preference to smoke waterpipe and its increasing popularity, and since waterpipe can cause maternal and neonatal complications, further studies are required in this respect. However, so far, no study has been conducted to investigate the prevalence and factors associated with waterpipe smoking during pregnancy among women living in Zahedan. Hence, this study was performed to determine the prevalence and factors related with waterpipe smoking among pregnant women living in Zahedan city in 2020.

## Methods

The present research was a cross-sectional study conducted between September and December 2020. All pregnant women living in Zahedan city constituted the research population of this study. The sample size was calculated as 384 using Cochran's formula for an uncertain population [ $N = z^2p(1-p)/d^2$ , accuracy ( $d = 0.05$ ),  $P = 0.5$ , and confidence interval 95% ( $z = 1.96$ )]. The sample size was considered 400 for greater confidence and to enhance the accuracy. The inclusion criteria were being in the third trimester of pregnancy and residence in Zahedan city. The subject would be excluded in case of unwillingness to participate in the study as well as inability to understand and speak Persian.

The sampling was performed by single stage cluster method. Considering the map of Zahedan city, four districts (North, South, East, and West) were specified. The clusters were the community healthcare centers in each district, with two centers chosen through random draw from each district. The names of the centers in each area were written on paper and placed in a container, and two centers were selected by drawing lots. The sampling was performed on the clients visiting the community healthcare centers. The questionnaires were completed through interview with

those satisfying the inclusion criteria who were also willing to participate in the study. The sampling in each center was performed until completion of the samples, and eventually 50 persons were investigated in each center.

For data collection, the demographics form, a questionnaire measuring awareness of waterpipe complications, and a questionnaire investigating the status of waterpipe smoking were used. The questionnaire measuring the awareness of waterpipe complications was a researcher-made scale. The validity of the tools was assessed by 10 reproductive and midwifery health and public health professionals, and the content validity index (CVI) and content validity ratio (CVR) were estimated at 0.81 and 0.75, respectively. The reliability of the scale was evaluated by test-retest method. The questionnaire was provided to 20 people who were again requested to complete the questionnaires 1 week later. The calculated correlation coefficient was equal to 0.78. The questionnaire measuring the awareness of waterpipe complications contained 13 items with 5-point Likert scale. To calculate the total score of each person, the scores of items were summed up together, with higher scores representing greater awareness; accordingly, the score range would be 13 to 65.

The questionnaire investigating the waterpipe smoking status included 15 items capturing the history, method and place of smoking, decision for quitting it, and its reasons. Preliminary questionnaire was designed after library investigations and studying credible papers and websites. The content validity of questionnaire was investigated and confirmed by 10 reproductive health and public health experts, and CVI and CVR were estimated at 0.8 and 0.77, respectively. To examine the reliability, test-retest method was used. The questionnaire would be provided to 20 people who were again requested to complete the questionnaires 1 week later. The calculated correlation coefficient was equal to 0.76.

For data collection, after acquiring permission from the ethics committee (IR.ZAUMS. hyperlink code of ethics: file:///C:/Users/Sam-pc/Downloads/fe2m0f5f4t46d1-1.pdf REC.1398.170) as well as other authorizations from Zahedan University of Medical Sciences, the researcher visited the selected healthcare centers of Zahedan city. After introducing herself and stating the research objectives to the subjects, the inclusion criteria were examined through asking questions. In case the women met the inclusion criteria, written informed consent form was filled by them. It was emphasized that the results would remain absolutely confidential and that there would be no personal information disclosure. Besides, the responses by subjects would not absolutely affect the therapeutic services they were about to receive. The study questionnaires were completed by the researcher in a private room.

Demographic and awareness questionnaires were completed by all samples, and the questionnaire investigating the

status of waterpipe smoking was completed in case of smoking. Eventually, the data were analyzed through descriptive statistics and analytical tests using SPSS 21, and  $P < 0.05$  was considered significant. Frequency, percentage, mean, and standard deviation were used to describe the demographic characteristics. For analytical purposes, multiple logistic regression test was applied.

## Results

In this study, 400 subjects participated as the sample. Prevalence of waterpipe smoking and demographic characteristics are shown in Table 1. The mean age of samples was  $27.71 \pm 6.61$ ; mean age of spouses was  $32.19 \pm 7.37$ ; mean number of pregnancies was  $3 \pm 1.89$ ; and the mean awareness score of subjects was  $49.8 \pm 9.15$ .

The results indicated that 18.8% of women had a history of waterpipe smoking during pregnancy [Table 1].

The onset age of waterpipe smoking among subjects was  $18.98 \pm 4.74$  years. The most common form of hookah use was occasional smoking (32%). About 89.3% of samples had a history of hookah use before pregnancy and 72% of them had attempted to reduce hookah use during pregnancy. The most common reason for the decrease in hookah use during pregnancy was fetal health concerns (64.8%). Relatives and friends of pregnant women used hookah

**Table 1: Sociodemographic characteristics of the study population**

Variable	Frequency	Percentage
Education		
Illiterate	53	13.2
Primary	183	45.8
High school	75	18.8
University	89	22.2
Husband education		
Illiterate	48	12
Primary	132	33
High school	137	34.2
University	83	20.8
Employment status		
Housewife	354	88.5
Employed	46	11.5
Employment status of husband		
Unemployed	34	8.5
Employed	366	91.5
Economic situation		
Adequate	121	30.2
Relatively adequate	151	37.8
Inadequate	128	32
Ethnicity		
Fars	140	35
Baluch	260	65
Hookah smoking		
Yes	75	18.8
No	325	81.2

more than others (72%). Most of the samples used hookah at home (76%) [Table 2].

Based on the results of logistic regression analysis, women's level of education, economic status, ethnicity, and awareness of the risks of smoking waterpipe were predictors of smoking ( $P < 0.05$ ,  $P = 0.03$ ,  $P = 0.006$ , and  $P < 0.001$ , respectively) [Table 3].

## Discussion

In this study, the prevalence of waterpipe smoking among pregnant women living in Zahedan city was 18.8%, which

**Table 2: Characteristics of waterpipe smoking in pregnancy of the study population**

Variable	Frequency	Percentage	Total (100)
Waterpipe smoking rate			
Only tried	3	4	75 (100)
Occasional use	24	32	
Once a week	7	9.3	
Several times a week	6	8.1	
Once a day	19	25.3	
Several times a day	16	21.3	
History of smoking before pregnancy			
Yes	67	89.3	75 (100)
No	8	10.7	
Try to reduce or stop smoking during pregnancy			
Yes	54	72	75 (100)
No	21	28	
Cause of reduction or cessation of smoking			
Fetal health	35	64.8	54 (100)
Reluctance to smoking	11	20.4	
Shortness of breath	4	7.4	
Training	3	5.6	
Opposition of relatives	1	1.9	
Smoking by husband			
Yes	27	36	75 (100)
No	48	64	
Smoking by Mother			
Yes	30	40	75 (100)
No	45	60	
Smoking by Father			
Yes	9	12	75 (100)
No	66	88	
Smoking by relatives and friends			
Yes	54	72	75 (100)
No	21	28	
Smoking in house			
Yes	57	76	75 (100)
No	18	24	
Smoking in friend's house			
Yes	25	33.33	75 (100)
No	50	66.67	

**Table 3: Multivariate logistic regression analysis of risk factors of hookah smoking in pregnancy**

Variable	Adjusted OR (95% CI)	P
Age (years)	1.002 (0.92-1.08)	0.96
Husband age (years)	1.02 (0.95-1.09)	0.95
Education		
Illiterate	Reference	
Primary	9.43 (0.79-111)	0.07
High school	10.54 (0.98-112)	0.05
University	12.61 (1.11-143)	0.04
Husband education		
Illiterate	Reference	
Primary	1.21 (0.22-6.74)	0.82
High school	2.79 (0.58-13.31)	0.19
University	2.79 (0.6-12.87)	0.18
Employment status		
Housewife	Reference	
Employed	1.84 (0)	0.99
Employment status of husband		
Unemployed	Reference	
Employed	0.6 (0.23-1.56)	0.3
Economic situation		
Adequate	Reference	
Relatively adequate	0.98 (0.44-2.2)	0.97
Inadequate	0.46 (0.22-0.93)	0.03
Ethnicity		
Fars	Reference	
Baluch	4.02 (1.47-10.95)	0.006
Gravid	1.1 (0.88-1.39)	0.37
Knowledge	0.89 (0.86-0.93)	< 0.001

is larger than the values reported in other parts of the country as well as other countries. Prevalence of waterpipe smoking among pregnant women living in southern villages of Iran,<sup>[13]</sup> Bandar Abbas,<sup>[12]</sup> Jordan,<sup>[8]</sup> Lebanon,<sup>[14]</sup> and USA<sup>[15]</sup> has been reported to be 8%, 13.5%, 8.7%, 5.5%, and 2.5%, respectively. This may reflect the high prevalence of waterpipe smoking among women living in Sistan and Baluchistan Province; the rate of waterpipe smoking among these women is 16.8%, while that of cigarette smoking is only 0.5% in women living in this city.<sup>[16]</sup> Waterpipe smoking is considered an acceptable social and cultural norm as compared with smoking cigarettes, which can play a role in high frequency of waterpipe smoking.<sup>[3]</sup> Various studies have indicated that waterpipe smoking occurs frequently in more populous families.<sup>[3,17]</sup> Many families living in Zahedan city are large in number,<sup>[18]</sup> which can contribute to increasing waterpipe smoking.

Based on our findings, 46.6% of women in the waterpipe smoking group smoked waterpipe every day, indicating the need to seriously pay attention to waterpipe smoking during pregnancy. The onset age of waterpipe smoking in this study was 18.98 years. In line with this study, it has been reported that the age of waterpipe smoking onset is 18.24 years among women living in Bandar Abbas.<sup>[17]</sup> In

a research performed in 2016 in Zahedan, the age of onset of smoking in women was reported to be 21.2 years.<sup>[19]</sup> Hence, in comparison to previous studies, the starting age of smoking has decreased among women. Hookah use is addictive in adolescents, and many toxic components such as carbon monoxide, nitrosamines, and heavy metals are found in hookah at higher levels than cigarette smoking, which can have many acute and chronic health consequences such as cancer and heart disease, chronic bronchitis, and nicotine addiction.<sup>[20]</sup>

In other words, waterpipe smoking is occurring during young reproductive ages, which will affect the subsequent pregnancies of women. In particular, the pregnancy age among women in Sistan and Baluchistan is low and their reproductive rate is high compared with the entire country.<sup>[18,21]</sup>

Furthermore, 89.3% of subjects stated that they smoked waterpipe before the study. According to Lopez *et al.* (2018),<sup>[22]</sup> the history of waterpipe smoking before pregnancy predicts its smoking during pregnancy. Besides, 72% of samples reported that they had tried to reduce waterpipe smoking during pregnancy or even stop it, and these statistics have been lower compared with American pregnant women. Kurti *et al.* (2018)<sup>[23]</sup> stated that 98.3% of pregnant women who used to smoke waterpipe before pregnancy quit it during pregnancy. The effect of pregnancy on waterpipe smoking may arise from the stigma of this type of smoking in some regions. In this study, the main reason of reducing smoking has been fetal health. Other studies also showed that fetal health can be considered the main factor of behavioral change during pregnancy.<sup>[24]</sup> Indeed, pregnant women have concerns about their fetal or neonatal health, which can create great motivation in them to change their behavior.<sup>[25]</sup> Healthcare providers may use this opportunity to train and promote healthy behaviors. Nevertheless, only 5.6% of the subjects in this study had received training to stop smoking, indicating the need for further attention in this regard.

Waterpipe smoking by surrounding people can also encourage the person to continue smoking. Based on the results of this study, in those who smoked waterpipe, 72% were acquaintances and friends, 40% were mothers, and 36% were spouses. Rahimzadeh *et al.*<sup>[26]</sup> also stated the liaison with waterpipe or cigarette smoking friends as one of the most important factors for the tendency toward waterpipe. Studies have shown that the effect of peers is the main factor of waterpipe smoking.<sup>[27]</sup> Today, waterpipe smoking has become a social performance, which can be done in houses, parties, house of friends and acquaintances, as well as restaurants.<sup>[27]</sup> In this study, waterpipe smoking at home and in friends' houses was 76% and 33%, respectively, which can facilitate the act of smoking. Similarly, Danaei *et al.*<sup>[6]</sup> showed that 34% of women living in Kerman smoked waterpipe in their friends' houses. Another research



conducted in northern Iran also showed that the social context of waterpipe smoking with friends as well as the number of close friends with whom one smoked waterpipe increased the probability of smoking. According to the theory of planned behavior, the social support a person receives from their friends and the pleasure obtained through smoking can contribute to the persistence of this behavior.<sup>[28]</sup> The social element is considerable in waterpipe smoking considering the high frequency of waterpipe smoking by the people around the person as well as waterpipe smoking at home. This indicates that waterpipe smoking is allowable in families and that there is a high level of approval from smoking in families.

The results of this research indicate that from among the investigated factors, women's level of education, economic status, and ethnicity had a positive relationship with smoking; higher levels of education and economic status plus Baluch ethnicity increased the chance of smoking compared with Fars ethnicity. However, awareness of the risks of waterpipe smoking had a negative relationship with waterpipe smoking and was indeed a protective factor against it.

In line with this research, Lopez *et al.* (2018)<sup>[22]</sup> also showed that in women of reproductive age, increasing level of education and ethnicity are predictors of waterpipe smoking. Other studies also revealed that women with academic levels of education are more likely to smoke compared with those having high school diploma or illiterate people.<sup>[3,6]</sup> This is possibly due to the peer pressure in university. People find many of their friends at university, and for spending their time, they may smoke waterpipe, which can be involved in increasing smoking in those with higher levels of education.<sup>[3]</sup>

The findings of this study indicated that good economic status is associated with waterpipe smoking. Also, the results of Mohammadi *et al.* (2017)<sup>[29]</sup> showed that waterpipe smoking has a positive relationship with income. Unlike these results, a study in Nepal on pregnant women reported that waterpipe smoking had an inverse relationship with economic status where those with lower levels of income smoked more frequently.<sup>[30]</sup> This is possibly due to the costs of smoking, especially group smoking. High income may encourage the person to initiate and sustain smoking.<sup>[29]</sup>

Based on this study, ethnicity plays a significant role in waterpipe smoking. Other investigations also confirm this finding.<sup>[31,32]</sup> The discrepancies observed across various ethnicities may result from differences in living environment, cultural norms and values, as well as social status such as level of education, income, and occupations.<sup>[32]</sup>

The risks of waterpipe smoking in pregnant women are more considerable because of concurrent effect on both the

mother and fetus. Indeed, waterpipe smoking is associated with increased pregnancy complications such as placental abruption, premature labor, stillbirth, as well as neonatal complications such as sudden infant death syndrome and low birth weight.<sup>[2,33]</sup> Nevertheless, one of the most important reasons for waterpipe smoking is lack of awareness about its dangers for health and the false belief that it is risk-free.<sup>[34,35]</sup> In this regard, society considers waterpipe smoking as less dangerous than cigarette, which can increase its health risks.<sup>[27]</sup> In many studies, the participants stated that waterpipe does not cause serious complications for the health and that the passage of gases through water reduces its harms.<sup>[35]</sup> Meanwhile, there are various kinds of advertisements which envisage smoking waterpipe as harmless.<sup>[36]</sup> Thus, the misconceptions should be corrected and training is necessary to increase awareness about the risks of waterpipe smoking.

The results of this study, which can be generalized to pregnant women in Zahedan, indicate that smoking is one of the most important issues among pregnant women in this city that needs special attention. Health messages should warn about the complications of waterpipe smoking in pregnancy, especially the fetal health as well as its short-term and long-term complications for women's health. Indeed, it should receive greater attention by healthcare personnel in trainings and pregnancy care. The young age of hookah smoking onset in girls is a wake-up call for health planners. Given the long-term consequences of hookah use in adolescence, interventions at this age can be cost-effective and beneficial. Based on our investigation, this was the first study to examine the prevalence and factors associated with waterpipe smoking among pregnant women in Zahedan city. Further research is justified to better understand the pattern of waterpipe smoking as well as other tobacco products among pregnant women and to develop strategies for controlling and reducing its consumption in the country.

The limitation of this study was the use of self-report method for data collection because the samples may have not been honest and could have underreported the waterpipe smoking in a purposeful way. Another limitation of this study is sampling only from women who had referred to health centers. Moreover, since this study was cross-sectional, causal relations cannot be established. In spite of these limitations, this research offered new information about the prevalence of waterpipe smoking and its associated factors among pregnant women, revealing its great significance especially for women and children's health, which have not been dealt with so far.

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## Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient(s) has/have given her/their consent for her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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## Conflicts of interest

There are no conflicts of interest.

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