

## RESEARCH ARTICLE

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# Assessment the Combining Medications with Tobacco during Water-Pipe Smoking among the University Students in Jordan

Naeem Shalan<sup>1</sup>, Yazun Jarrar<sup>2,3\*</sup>, Wisam Nasser<sup>4</sup>, Sura Al Zoubi<sup>2</sup>, Qais Jarrar<sup>3,5</sup>, Mohammad A Salahat<sup>6</sup>, Batool Qutami<sup>2</sup>

## Abstract

**Background:** Water-pipe smoking, popularly known as “hookah” or “shisha,” is a widespread social activity in the Middle East, involving the use of a water-filtered device to vaporize flavored tobacco. A concerning trend has emerged as individuals add various drugs to the tobacco mixture, complicating the health implications. **Aims:** This study aimed to explore the prevalence, demographic factors, and motivations behind drug mixing with tobacco in shisha among university students in Jordan. **Methods:** In this descriptive cross-sectional study, a structured questionnaire was used to collect data on participants’ demographics, shisha smoking habits, drug mixing practice and the motivations behind it. Four hundred and sixty-nine (469) students, aged 18-30 years, including medical and non-medical students, from two universities in Jordan participated in this study. **Results:** Approximately 18% of participants reported mixing drugs with tobacco in shisha, with paracetamol being the predominant choice (80%). Motivations varied, with 42% seeking euphoric effects, 46% a relaxing experience, and 12% a sedative outcome. Males (73%) showed a higher frequency of drug mixing compared to females (27%). In addition, non-medical reported mixing drugs with the tobacco of water-pipe more than medical students. **Conclusions:** This study provides valuable insights into the complex phenomenon of drug mixing with tobacco in water-pipe smoking among university students in Jordan. The findings highlight the need for further research on clinical implications and interventions to address this emerging trend.

**Keywords:** Drug mixing- Jordan- paracetamol- university students- water-pipe smoking

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## Introduction

Water-pipe smoking, also known as “hookah” or “shisha,” is a popular social activity, especially in the Middle East. It involves using a water-filtered device to vaporize flavored tobacco [1]. However, a worrying trend is emerging as some people are adding various drugs to the tobacco mixture, which goes beyond the usual way of using both water-pipes or drugs and introduces a mix of different substances.

In the Middle East, where water-pipe smoking is deeply rooted in culture, the habit has not only continued but has also become more popular [2-4]. Some individuals, especially in Middle Eastern countries including Jordan, are now combining drugs with water-pipe smoking, making the health implications even more complicated. The reasons for this trend are still unclear.

Even though some people practice this, the health effects of adding drugs to tobacco in water-pipe

smoking are not well understood. The complex chemical interactions between added substances to tobacco, the change in the added drug’s pharmacokinetics and pharmacodynamics, as well as the physical consequences for the smoker, need thorough exploration [5, 6]. Understanding the potential risks and long-term impacts of this trend (mixing drugs with tobacco), is crucial for a comprehensive understanding of the consequences of water-pipe smoking.

Many university students engage in water-pipe smoking as a form of recreation and socializing. The appeal of hookah use among students may be linked to its perceived communal nature, the variety of available flavors, and the relaxed atmosphere it creates [7, 8]. However, it’s important to note that the growing trend of mixing drugs with the tobacco of the water-pipe also raises concerns, especially about the potential health implications. As the popularity of drug-infused water-pipe smoking continues to grow, it is essential for scientific

<sup>1</sup>Pharmacological and Diagnostic Research Center, Faculty of Pharmacy, Al-Ahilyia Amman University, Amman 19328, Jordan. <sup>2</sup>Department of Basic Medical Sciences, Faculty of Medicine, Al-Balqa Applied University, Al-Salt 19117, Jordan. <sup>3</sup>INTI International University, Nilai, Malaysia. <sup>4</sup>Department of Pharmacy, Al-Zaytoonah University of Jordan, Amman 11733, Jordan. <sup>5</sup>Department of Applied Pharmaceutical Sciences and Clinical Pharmacy, Faculty of Pharmacy, 108568, Isra University, Amman, Jordan. <sup>6</sup>Department of Physiotherapy, Faculty of Allied Medical Sciences, Aqaba University of Technology, Aqaba, Jordan. \*For Correspondence: yazun.jarrar@bau.edu.jo

research to investigate the motivations of this practice. To the best of our knowledge, there is a lack of studies regarding missing of drugs with the tobacco of water-pipe smoking. This study aimed to provide insights into the prevalence and motivations behind the mixing of drugs with tobacco in the water-pipe among university students in Jordan. This research can guide public health interventions and policies to address potential factors associated with mixing drugs and tobacco in water-pipe use and how to overcome this phenomenon in future.

## Materials and Methods

### Study design and Participants

This is an observational, cross-sectional study that was conducted on university students aged 18-30 years who had smoked shisha in the past six months. The questionnaire was distributed among students of Al-Zaytoonah University and Isra University in Jordan. These Universities are located in the capital city and have students from different geographical regions in Jordan. Accordingly, the sample of students in this study from these universities represents students from Jordan.

Regarding the sample size calculation, the significance level is set at  $\alpha=0.05$  with a 95% confidence interval, where the Z value for the 95% confidence interval is 1.96, and the precision is 0.05. The expected prevalence in the sample with the characteristic of interest is assumed to be 0.5. Accordingly, an estimated 292 volunteers are needed for this study. A total of 469 students participated in the study, of which 321 were males.

### The questionnaire

Data were collected using a structured questionnaire administered by the investigators to the students from October 2018 to February 2019 using paper sheets. The questionnaire comprised multiple sections, starting with demographic information such as age, gender, academic year, and field of study. Participants were also asked about their shisha smoking habits, including frequency, duration, and locations where they engaged in the water-pipe smoking. A key aspect of the survey focused on drug mixing, inquiring whether participants mixed drugs with tobacco in their water-pipe smoking. For those who indicated drug mixing, there was a section specifying the types of drugs mixed, and an open-ended question explored the reasons behind this behavior.

Convenience sampling was employed, with the survey sheet distributed to university students through academic departments, student organizations, and various social media platforms. Participants accessed the questionnaire anonymously, emphasizing voluntary participation and the right to withdraw.

### Ethical considerations

The informed consent was obtained from each participant before responding to the questions of this survey. The ethical committee at Al-Zaytoonah University approved the protocol of this study.

### Statistical analysis

Statistical Package for the Social Sciences (SPSS) software (Version 26, IBM, USA) was used to analyze the data of this study. The Chi-square test was used to compare the frequencies. P value was considered significant when its value was less than 0.05.

## Results

### Demographic data

The demographic data of the student participants are represented in Table 1. The study sample (469 participants) consisted of 321 males and 148 females with an average age of  $22\pm 7$  years. Among the students, there were 92 first-year, 86 second-year, 124 third-year, 79 fourth-year, and 88 fifth-year students. Of these, 230 were medical students (studying pharmacy), while the remaining were non-medical students (136 were in business and marketing programs and 103 were civil or electrical engineering students).

### Prevalence of mixing drugs with the tobacco water-pipe

Examining the prevalence of drug mixing with tobacco in shisha, approximately 18% of participants reported engaging in this behavior. Among those who admitted to combining substances, paracetamol emerged as the predominant choice, with a noteworthy percentage of 80% (Table 2). Students also reported that other drugs were mixed with tobacco including the anti-histamine

Table 1. Demographic Data of the Participants

Anthropometric parameter	Count (Percentage) N (%)
Sex	
Male	321 (68.4%)
Female	148 (31.6%)
Age	
Average $\pm$ SD	22 $\pm$ 7
Academic year	
First	92 (19.7%)
Second	86 (18.3%)
Third	124 (26.4%)
Fourth	79 (16.8%)
Fifth	88 (18.8%)
Field of study	
Pharmacy	230 (49.0%)
Business & Marketing	136 (29.0%)
Civilian & Engineering	103 (22.0%)

Table 2. Types and Percentages of the Drugs Mixed with Tobacco in the Water-Pipe Smoking

Substance Combined	Count (Percentage) N (%)
Paracetamol	68 (80%)
Chlorpheniramine	6 (7%)
N-Butyl Hyoscine	7 (7%)
Pregabalin	5 (6%)

Table 3. Motivations for Mixing Drugs with Tobacco in Shisha among Students

Motivation	Percentage of Participants
Euphoric Effects	42%
Relaxing Experience	46%
Sedative Effect	12%

chlorpheniramine (7%), the anti-muscarinic n-butyl hyoscine (7%), and the anti-convulsant pregabalin (6%), as shown in Table 2.

#### Reasons for mixing drugs with the tobacco of water-pipe

Exploring why people mix drugs with tobacco in the water-pipe, students gave different reasons, as represented in Table 3. A good share (42%) said they wanted to feel euphoric, seeking a happy or pleasurable mood. Almost half (46%) mentioned they were looking for a relaxing feeling. A smaller group (12%) said they wanted a sedative effect.

#### Factors associated with mixing drugs with the tobacco of water-pipe

The mixing of paracetamol with tobacco was found to be more significantly ( $P > 0.05$ ) frequent among males, constituting 73% of cases, compared to females who represented 27% (Table 4). In addition, non-medical students (83% marketing and engineering students) significantly mixed the drugs with tobacco more frequently than the medical students (17%) ( $P < 0.05$ ), as shown in Table 4.

## Discussion

The presented study investigates the phenomenon of drug mixing with tobacco in the water-pipe among university students in Jordan, providing a comprehensive examination of prevalence, demographic factors, and underlying motivations. To the best of our knowledge, it is the first study that described this phenomenon. We found that a significant number of university students add drugs, especially paracetamol, to the tobacco of the water-pipe to get the euphoric effect. The health concern about using paracetamol as a ground powder mixed with tobacco is unknown. Paracetamol or acetaminophen is formulated to be administered orally, parentally, or rectally as an analgesic and antipyretic drug [9, 10]. However, there is no data about the effect of smoked (inhaled) paracetamol on the body's health. Additionally, the high temperature in the water-pipe smoke may affect the chemical stability of the drug and lead to its conversion to other substances with unknown biological responses.

There is still no data available about how mixing paracetamol with tobacco of water-pipe caused the euphoric feeling among most of the users. The mechanism of action of paracetamol is believed to primarily work in the central nervous system to reduce the production of prostaglandins [11]. Recent studies reported that paracetamol has serotonergic and dopaminergic activities [12, 13], which can modulate the mood in the central

Table 4. Comparison of Drug Mixing Patterns based on the Gender and Student Type

Group	Percentage of Participants	P value *
Gender-Based Mixing		
Male	62 (73%)	0.02
Female	23 (27%)	
Student type mixing		
Non-Medical Students	71 (83%)	0.007
Medical Students	14 (17%)	

\*, indicates a significant P value using Chi-square analysis

nervous system. It can be speculated that smoked tobacco mixed with paracetamol enhances the mood by affecting the dopaminergic activity in the central nervous system or there is a chemical interaction between paracetamol and the chemicals of tobacco which results in enhancing the mood, or there are other factors that need investigation.

The lower frequency of drug mixing among medical students compared to their non-medical counterparts may be influenced by factors such as rigorous academic training, practical experiences emphasizing health and well-being, and a commitment to public health promotion [14]. The demanding nature of medical studies may also contribute to a reduced inclination for engaging in risky behaviors like mixing drugs with tobacco in water pipes. The medical field's emphasis on evidence-based practices and understanding the consequences of substance use could play a role in steering medical students away from such practices [15].

A notable gender-based difference emerged, indicating that the mixing of paracetamol with tobacco was more frequent among males (73%) than females (27%). This finding prompts further exploration into potential sociocultural factors influencing gender-specific patterns of drug mixing among university students, essential for designing targeted prevention and intervention strategies [16]. The study acknowledges certain limitations, including reliance on self-reported data and this study did not include other universities located in the Southern and Northern parts of Jordan which warrens the need for future studies that include wider demography.

In conclusion, this study provided insights into the prevalence, demographic patterns, and motivations behind drug mixing with tobacco in the water-pipe among university students in Jordan. The nuanced understanding gained from this research lays the groundwork for future investigations to address this behavior within the context of university environments, and to find out the clinically harmful effects of this phenomenon.

## Author Contribution Statement

Naeem Shaalan and Yazun Jarrar wrote this manuscript, Sura Al-Zubi, Batool Qutami and Mohammad A Salahat revised this manuscript, Qais Jarrar and Wisam Nasser collected and analyzed the data. The supervision of this word was done by Yazun Jarrar.

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### Availability of data

Data are available with the corresponding author upon request.

### Ethical issue

The protocol of this study was approved by the ethical committee in Al-Zaytoonah University of Jordan.

### Conflict of interest

The authors declare no conflict of interest in preparing this article.

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