HOOKAH FROM THE MIDDLE EAST TO WESTERN COUNTRIES

Feras I. Hawari, M.D
Director, Cancer Control Office
Chief, Section of Pulmonary and Critical Care
King Hussein Cancer Center

Director, Global Bridges, EMR

Mayo Clinic's 20th Annual Nicotine Dependence Conference

Disclosures

- Sub-award unrestricted educational grant from Global Bridges
- American Cancer Society capacity building grant to strengthen tobacco control in Jordan
- Virginia Commonwealth University grant to study the acute effect of Hookah exposure on lung function and cardio-pulmonary exercise testing

مركز الحسين للسرطان
KING HUSSEIN CANCER CENTER

مكتب مكافحة السرطان
CANCER CONTROL OFFICE

الوقاية
الكشف المبكر
التشخيص والعلاج
الرعاية التلطيفية

Prevention
Early Detection
Diagnosis & Treatment
Palliative Care

Outline

- Anatomy and epidemiology
- Toxicology
- Evidence-based health effects
- Managing hookah dependence
- Policy on hookah

مركز الحسين للسرطان
KING HUSSEIN CANCER CENTER

مكتب مكافحة السرطان
CANCER CONTROL OFFICE

الوقاية
الكشف المبكر
التشخيص والعلاج
الرعاية التلطيفية

Prevention
Early Detection
Diagnosis & Treatment
Palliative Care

ANATOMY AND EPIDEMIOLOGY

مركز الحسين للسرطان
KING HUSSEIN CANCER CENTER

مكتب مكافحة السرطان
CANCER CONTROL OFFICE

الوقاية
الكشف المبكر
التشخيص والعلاج
الرعاية التلطيفية

Prevention
Early Detection
Diagnosis & Treatment
Palliative Care

Overview

- Invented in India during the 16th century by an Indian physician
- Smoke “should be passed through a container of water so that it would be rendered harmless”
- Today, hookah cafés are gaining popularity around the globe, including Middle East ,Britain, France, Russia and the United States

Different names, same concept …

- Africa, India, US
- Egypt, KSA
- Jordan, Lebanon, Syria
- Iran
- Pakistan
- China

- Waterpipe
- Shisha, Borry, Goza
- Narghile, Arghile
- Ghalyoun, Ghalyan
- Huqqa
- Shui yan dai
- Hubble Bubble

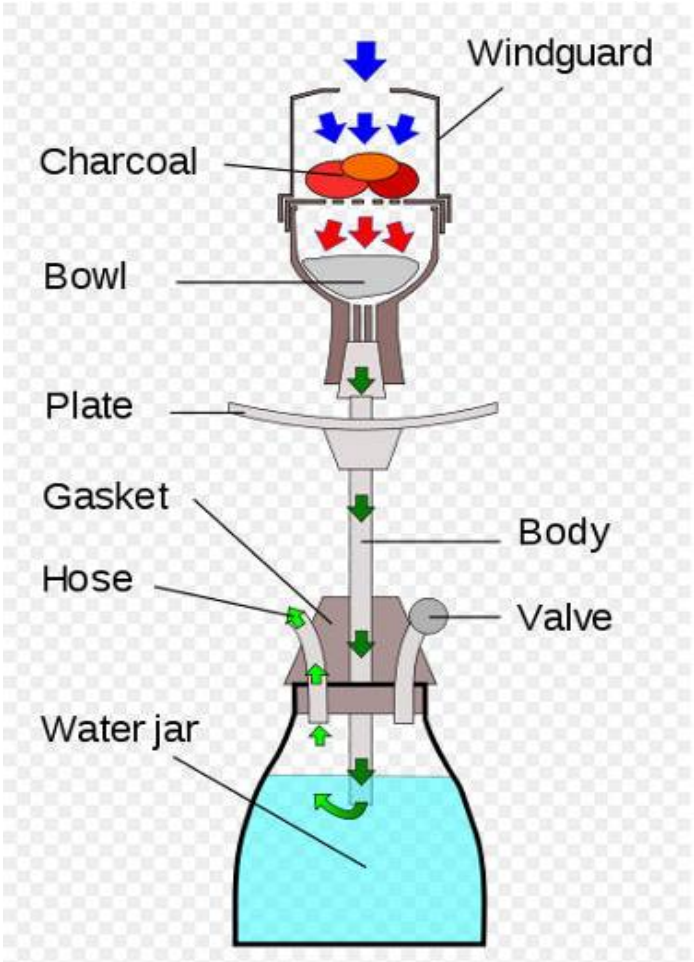
مركز الحسين للسرطان
KING HUSSEIN CANCER CENTER

مكتب مكافحة السرطان
CANCER CONTROL OFFICE

الوقاية
الكشف المبكر
التشخيص والعلاج
الرعاية التلطيفية

Prevention
Early Detection
Diagnosis & Treatment
Palliative Care

Anatomy of Hookah



مركز الحسين للسرطان
KING HUSSEIN CANCER CENTER

مكتب مكافحة السرطان
CANCER CONTROL OFFICE

الوقاية
الكشف المبكر
التشخيص والعلاج
الرعاية التلطيفية

Prevention
Early Detection
Diagnosis & Treatment
Palliative Care

مركز الحسين للسرطان
KING HUSSEIN CANCER CENTER

مكتب مكافحة السرطان
CANCER CONTROL OFFICE

الوقاية
الكشف المبكر
التشخيص والعلاج
الرعاية التلطيفية

Prevention
Early Detection
Diagnosis & Treatment
Palliative Care

Choose the single best answer:

1) The rate of HTS is highest among young people
2) 30% of college students report ever using HTS
3) 10% of college students report using hookah in the past 30 days
4) In the US, HTS is nearly as common as cigarette use
5) All of the above

Choose the single best answer:

1) The rate of HTS is highest among young people
2) 30% of college students report ever using HTS
3) 10% of college students report using hookah in the past 30 days
4) In the US, HTS is nearly as common as cigarette use
5) **All of the above**

مركز الحسين للسرطان
KING HUSSEIN CANCER CENTER

مكتب مكافحة السرطان
CANCER CONTROL OFFICE

الوقاية
الكشف المبكر
التشخيص والعلاج
الرعاية التلطيفية

Prevention
Early Detection
Diagnosis & Treatment
Palliative Care

Prevalence of Adult Hookah Use in Western Countries

Country	WP Use	Rate	Study
British university students	ever WP use	38%	Jackson & Aveyard, 2008
French high school students	ever WP use	40%	Jackson & Aveyard, 2008
US universities	current WP use	7 to 20%	Cobb et al, 2010
(a sample of 8745 students in eight colleges in the US)	ever WP use current WP use	29.5% 7.2%	Primack, Fertman, Rice, Adachi-Mejia, & Fine, 2010

Prevalence of Adult Hookah Use in Western Countries

Country	WP Use	Rate	Study
United States			
12th graders/ Arizona	current WP users	7%	Barnett et al, 2009
high school students/ Florida	ever WP users	11%	Barnett et al, 2009
Canada			
youth (15–24 years)	ever WP users	8%	Canadian Tobacco Use Monitoring Survey (CTUMS), 2006

Prevalence of Adult Hookah Use in the EMR

Country	WP Use	Rate	Study
Pakistan			
university students	current WP use	33%	Anjum, Ahmed, & Ashfaq, 2008; Jawaid et al, 2008
school students	current WP use	17%	
Jordan			
university students	current WP use	42.7%	Azab et al., 2010

Hookah Use Among Future Healthcare Professionals in EMR

Country	Current WP Use	Study
Medical Students		
Lebanon	20.6%	Almerie et al, 2008
Syria	23.5%	
Turkey	28.6%	
Nursing Students		
Jordan	40.5%	GHPSS/Jordan-2007

Prevalence of Hookah Use Among the Youth Globally

- **GYTS Report:** looking at time trends of tobacco use (1999–2008) among youth showed that cigarette smoking is either stable or declining, other forms of tobacco use are showing a rising trend, most notably WP smoking
- Report included more than half a million youth ages 13–15 years, involving 209 surveys in 95 countries and 5 areas

Warren et al.,2009

Prevalence of Hookah Use Among the Youth in EMR

- GYTS results from 16 countries and Gaza Strip suggest that current WP smoking ranges between 6-34% among 13–15 year olds

Warren et al, 2009

Waterpipe and Cigarette Smoking Among College Athletes in the United

Methods:

- Online survey of 8,745 college students at eight institutions as part of the revised National College Health Assessment
- Used multivariable regression models to assess the associations between tobacco use (cigarette and waterpipe) and organized sports participation

Primack et.al. J Adolesc Health. 2010

Waterpipe and Cigarette Smoking Among College Athletes in the United

Results:

- Sports participants of any type had lower odds of having smoked cigarettes.
- Participants who played intramural sports (odds ratio=1.15, 95% confidence interval ¼ 1.03, 1.29) or club sports (odds ratio= 1.15, 95% confidence interval= 1.001, 1.33) had significantly higher odds of having smoked waterpipe tobacco.

مركز الحسين للسرطان
KING HUSSEIN CANCER CENTER

مكتب مكافحة السرطان
CANCER CONTROL OFFICE

الوقاية
الكشف المبكر
التشخيص والعلاج
الرعاية التلطيفية

Prevention
Early Detection
Diagnosis & Treatment
Palliative Care

Waterpipe and Cigarette Smoking Among College Athletes in the United

Conclusions:

- College athletes are susceptible to waterpipe tobacco use
- Compared with nonathletic counterparts, club sports participants and intramural sports participants generally had higher odds of waterpipe tobacco smoking
- Allure for waterpipe tobacco smoking may exist even for individuals who are traditionally considered at low risk for tobacco use

مركز الحسين للسرطان
KING HUSSEIN CANCER CENTER

مكتب مكافحة السرطان
CANCER CONTROL OFFICE

الوقاية
الكشف المبكر
التشخيص والعلاج
الرعاية التلطيفية

Prevention
Early Detection
Diagnosis & Treatment
Palliative Care

All statements are correct except:

1) Hookah smokers are as interested as cigarette smokers in quitting smoking
2) HTS can cause addiction
3) Some of the nicotine is dissolved in the water so smokers compensate by smoking for longer duration and thus expose themselves to more toxins
4) HTS is affordable

All statements are correct except:

1) **Hookah smokers are as interested as cigarette smokers in quitting smoking**
2) HTS can cause addiction
3) Some of the nicotine is dissolved in the water so smokers compensate by smoking for longer duration and thus expose themselves to more toxins
4) HTS is affordable

Why is HTS spreading so much?

Accessibility:

- Availability
- Affordability
- Innovation
- Influence of media
- Lack of a policy framework
- Sensory characteristics evoked

Misperceptions:

- Less addictive & less harmful than cigarettes
- Users can quit at any time
- Primary motives for hookah smoking are outings with friends, company, boredom and wasting time
- More socially acceptable than cigarettes
- Can relieve stress and tension

Nakkash et al, 2011

Amin T et al, 2010

مركز الحسين للسرطان
KING HUSSEIN CANCER CENTER

مكتب مكافحة السرطان
CANCER CONTROL OFFICE

الوقاية
الكشف المبكر
التشخيص والعلاج
الرعاية التلطيفية

Prevention
Early Detection
Diagnosis & Treatment
Palliative Care

- Social activity
- People share hookah
- Often mix cigarettes and hookah

Prevention
Early Detection
Diagnosis & Treatment
Palliative Care

INT J TUBERC LUNG DIS 16(11):1551–1557

http://dx.doi.org/10.5588/ijtld.12.0152
E-published ahead of print 18 September 2012

Ethnicity and waterpipe smoking among US students

S. Abughosh,* I-H. Wu,* R. J. Peters,† F. Hawari,‡ E. J. Essien*†

*Institute of Community Health, College of Pharmacy, University of Houston, Houston, Texas, †School of Public Health, University of Texas Health Science Center at Houston, Houston, Texas, USA; ‡King Hussein Cancer Center, Cancer Control Office, Amman, Jordan

مركز الحسين للسرطان
KING HUSSEIN CANCER CENTER

مكتب مكافحة السرطان
CANCER CONTROL OFFICE

الوقاية
الكشف المبكر
التشخيص والعلاج
الرعاية التلطيفية

Prevention
Early Detection
Diagnosis & Treatment
Palliative Care

Ethnicity and Waterpipe Smoking Among US Students

- **OBJECTIVES: Examine effect of ethnicity on WP smoking among college students.**
- **DESIGN:**
  - A cross-sectional study
  - Online survey (*n* = 2334) from March to April 2011. The survey included questions on demographic characteristics (sex, age, race/ ethnicity), tobacco use experience, risk perception, social acceptability and popularity.
- **We determined predictors of WP use with three outcomes:**
  - ever-use vs. no use
  - past-year use vs. no use
  - past-month use vs. no use

Ethnicity and Waterpipe Smoking Among US Students

Results:

- Half of the sample had previously smoked tobacco using a WP:
  - A third in the past year and 12.5% in the past month
- Significant predictors of WP use included
  - Middle Eastern ethnicity
  - Middle Eastern friend
  - Past cigarette or cigar use
- Perception of harm was associated with less use in the ever-use model
- Perceived addictiveness, social acceptability and popularity of WP were predictors in all models

مركز الحسين للسرطان
KING HUSSEIN CANCER CENTER

مكتب مكافحة السرطان
CANCER CONTROL OFFICE

الوقاية
الكشف المبكر
التشخيص والعلاج
الرعاية التلطيفية

Prevention
Early Detection
Diagnosis & Treatment
Palliative Care

Ethnicity and Waterpipe Smoking Among US Students

Conclusions:

- It is important to develop culturally appropriate interventions to control WP smoking among Middle Eastern Americans and those of Indian/Pakistani descent to curb further spread in US society
- It is important to develop interventions that target the perceived addictiveness, social acceptability and popularity of WP smoking

مركز الحسين للسرطان
KING HUSSEIN CANCER CENTER

مكتب مكافحة السرطان
CANCER CONTROL OFFICE

الوقاية
الكشف المبكر
التشخيص والعلاج
الرعاية التلطيفية

Prevention
Early Detection
Diagnosis & Treatment
Palliative Care

TOXINS IN HOOKAH

مركز الحسين للسرطان
KING HUSSEIN CANCER CENTER

مكتب مكافحة السرطان
CANCER CONTROL OFFICE

الوقاية
الكشف المبكر
التشخيص والعلاج
الرعاية التلطيفية

Prevention
Early Detection
Diagnosis & Treatment
Palliative Care

All of the following statements about toxins in hookah are correct except:

1) Mu'essel (flavored) tobacco used when smoking hookah contains a significant amount of nicotine
2) The use of charcoal increases the health risks from smoking hookah
3) The water filters most of the toxins rendering hookah smoke harmless
4) Exposure to second hand smoke from hookah is harmful

All of the following statements about toxins in hookah are correct except:

1) Mu'essel (flavored) tobacco used when smoking hookah contains a significant amount of nicotine
2) The use of charcoal increases the health risks from smoking hookah
3) **The water filters most of the toxins rendering hookah smoke harmless**
4) Exposure to second hand smoke from hookah is harmful

Tobacco Used in Hookah

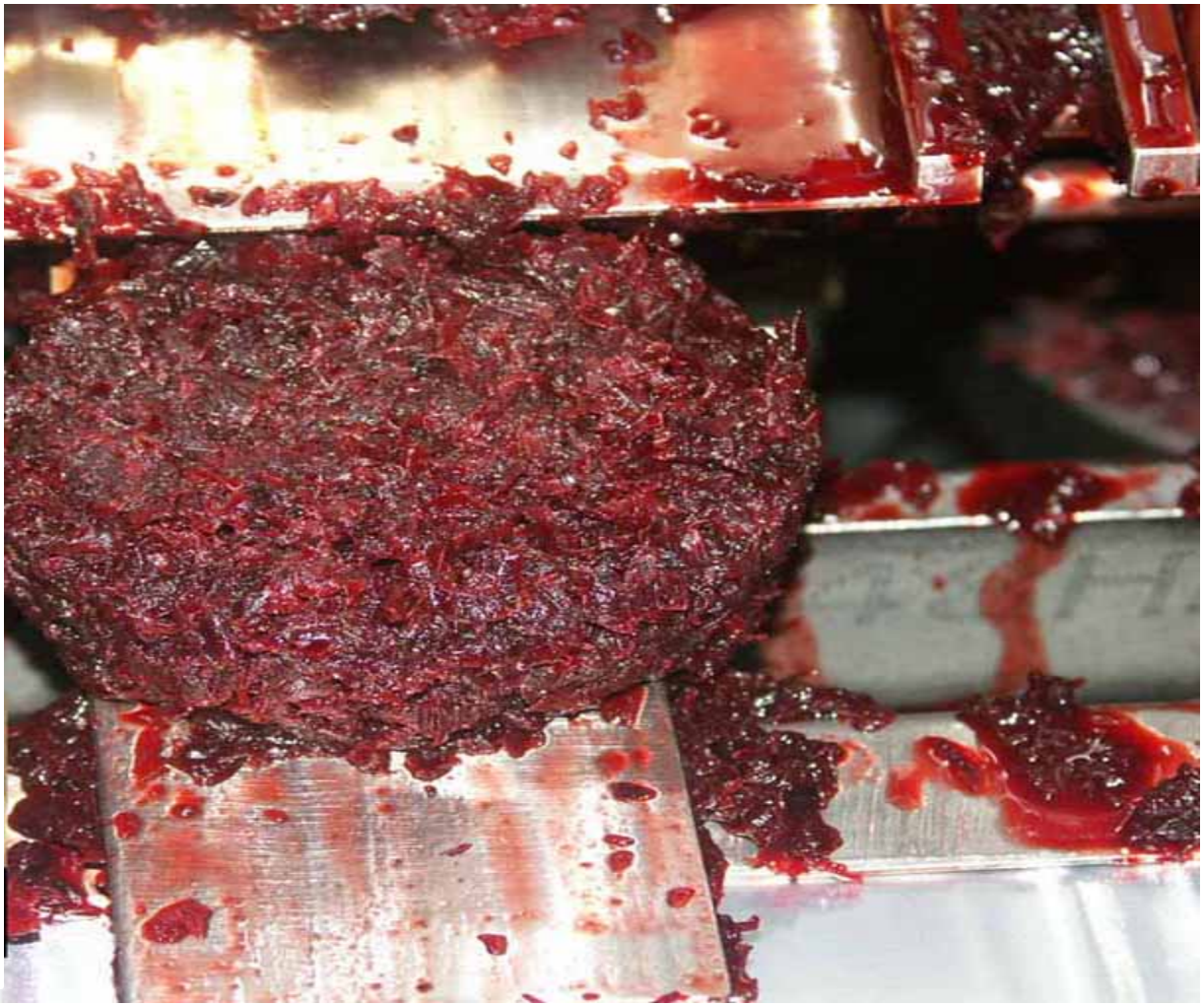
Mu'essel: based on fruits and other artificial flavors (cola, bubble gum, etc…) contains ~30% tobacco & 70% molasses (honey)

Jurak: Indian origin, contains fruits or oils, but sometimes could be unflavored

Ajami (Tumbak): pure dark paste of tobacco

The tobacco used in one hookah smoking session weighs ~10 to 20g

Tobacco Juices and Variety of Flavors



مركز الحسين للسرطان
KING HUSSEIN CANCER CENTER

مكتب مكافحة السرطان
CANCER CONTROL OFFICE

الوقاية
الكشف المبكر
التشخيص والعلاج
الرعاية التلطيفية

Prevention
Early Detection
Diagnosis & Treatment
Palliative Care

Charcoal

- Increases the health risks by producing high levels of carbon monoxide, metals, and cancer-causing chemicals
- A restricted product under the Hazardous Products Act. According to the Canadian Department of Justice

الكشف المبكر
التشخيص والعلاج
الرعاية التلطيفية

Prevention
Early Detection
Diagnosis & Treatment
Palliative Care

Cigarettes vs. Hookah

Cigarette Smoking

- Up to 0.9L in 7 min

Hookah smoking

- 7.5-200L in 20-80 min
- Equivalent of up to 100-200 times the volume in one cigarette

World Health Organization Study Group on Tobacco Product Regulation (TobReg). *Advisory Note: Waterpipe Tobacco Smoking: Health Effects,Research Needs and Recommended Actions by Regulators. 2005. Available at: http://www.who.int/tobacco/global_interaction/tobreg/Waterpipe%20*
recommendation_

Toxins in Hookah

- **Polyaromatic Hydrocarbons (PAH):**
  - 100 chemicals formed during the incomplete burning of coal, oil and gas, garbage, or other organic substances like tobacco
- **Nitrosamines (TSNA):**
  - only in tobacco products
  - formed from nicotine and related compounds by a nitrosation reaction that occurs during the curing and processing of tobacco
- **Heavy metals:**
  - Arsenic
  - Beryllium
  - Chromium
  - Cobalt
  - Lead
  - Nickel

Toxicant Yields

Toxin (ng)	Waterpipe[1]	Cigarette[2]
Arsenic	165	80
Beryllium	65	300
Chromium	1340	37
Cobalt	70	0.17
Lead	6870	60
Nickel	990	17

[1]Shihadeh, 2003; [2]Hoffman, 2000

Cigarettes vs. Hookah

Chemicals Found in Hookah Smoke *versus* Cigarette Smoke

Adapted from Shihadeh and Saleh, 2005; and Asotra, 2005

Chemical	Yield from 10 gm hookah tobacco[a]	Yield from 1 cigarette[b]	Multiple of average cigarette smoke value
"Tar," mg	802	Range: 1-27 Average: 11.2	72X
Nicotine, mg	2.96	Range: 0.1-2 Average: 0.77	4X
Carbon monoxide CO, mg	143	Range: 1-22 Average: 12.6	11X
PAH Phenanthrene, µg (co-carcinogen)	0.748	0.2-0.4	2.5X
Fluranthracene, µg (co-carcinogen)	0.221	0.009-0.099	4X
Chrysene, µg (tumor initiator)	0.112	0.004-0.041	5X

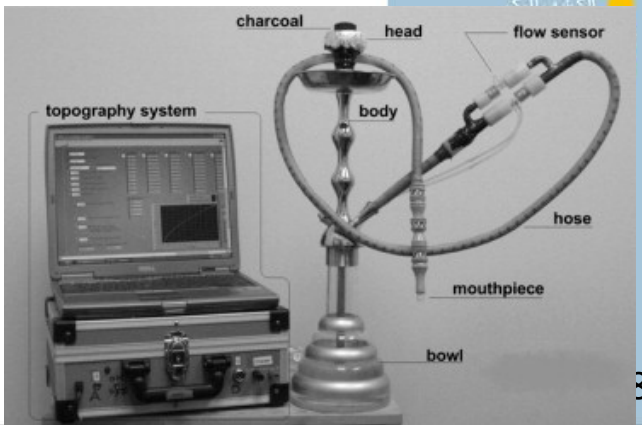
[a] Ten grams of tobacco mixture used in hookah head, 171 2.6-second puffs of 0.631 volume each, spaced 30 s apart, fueled with 1.5 quick-lighting charcoal disks.

[b] Reported ranges of commercial cigarettes (Jenkins et al, 2000), and arithmetic mean for 1294 domestic cigarette brands tested by FTC for 1998 (FTC, 2000).

Shihadeh, A. and Saleh, R. 2005. Polycyclic aromatic hydrocarbons, carbon monoxide, "tar", and nicotine in the mainstream smoke aerosol of the narghile water pipe. *Food and Chemical Toxicology* 43(5):655-661. Asotra, K. 2005. "Hooked on Hookah? What You Don't Know Can Kill You." TRDRP Newsletter, 7(3):August 2005.

Cigarettes vs. Hookah (Puff Topography)

	Cigarettes	Waterpipe
Puffs	8-12	50-200
Duration/minute	5-7	20-80
Smoke/liters	0.5-0.6	0.15-1
Carbon Monoxide/ ppm	4.0	35.5



WHO Advisory Note: "Waterpipe Tobacco Smoking: Health Effects, Research Needs and Recommended Actions by Regulators, 2005

CAN HOOKAH CAUSE DEPENDENCE?

مركز الحسين للسرطان
KING HUSSEIN CANCER CENTER

مكتب مكافحة السرطان
CANCER CONTROL OFFICE

الوقاية
الكشف المبكر
التشخيص والعلاج
الرعاية التلطيفية

Prevention
Early Detection
Diagnosis & Treatment
Palliative Care

Hookah Dependence

- One session of 10 gm hookah tobacco produce 4 times the nicotine in one cigarette

- Daily use of WP produced a 24-hr urinary cotinine level of 0.785 microg/ml (equivalent to smoking 10 cigarettes/day)

  Neergaard J. et al. 2007

مركز الحسين للسرطان
KING HUSSEIN CANCER CENTER

مكتب مكافحة السرطان
CANCER CONTROL OFFICE

الوقاية
الكشف المبكر
التشخيص والعلاج
الرعاية التلطيفية

Prevention
Early Detection
Diagnosis & Treatment
Palliative Care

Hookah Dependence (2)

Nicotine & Tobacco Research, Volume 11, Number 7 (July 2009)

Table 1. Scores of subjective questionnaires and physical measurements pre–post waterpipe use after 24-hr abstinence (*N* = 61)

Measure	Presmoking; *M* ± *SD*	Postsmoking; *M* ± *SD*	Difference (post–pre)	Paired *t*	*p**
CO	4.0 ± 1.7	35.5 ± 32.7	31.5	−7.550	.000
Hughes–Hatsukami scale					
1—Urges to smoke	39.5 ± 33.2	22.0 ± 30.2	−17.5	4.047	.000
2—Irritability/frustration/anger	21.8 ± 29.6	16.9 ± 24.4	−4.9	1.088	.281
3—Anxious	26.5 ± 28.0	19.3 ± 26.2	−7.1	1.844	.070
4—Difficulty concentrating	21.7 ± 27.5	19.4 ± 25.2	−2.3	0.529	.599
5—Restlessness	31.4 ± 32.3	19.3 ± 24.2	−12.1	2.854	.006
6—Hunger	27.4 ± 30.3	29.7 ± 31.4	2.3	−0.562	.576
7—Impatient	30.8 ± 34.0	22.4 ± 28.9	−8.4	1.747	.086
8—Craving a waterpipe/nicotine	36.7 ± 35.8	18.0 ± 25.8	−18.8	4.415	.000
9—Drowsiness	18.1 ± 23.7	24.4 ± 26.3	6.3	−1.857	.068
10—Depression/feeling blue	21.6 ± 30.9	21.8 ± 27.2	0.2	−0.053	.958
11—Desire for sweets	35.7 ± 36.4	36.8 ± 35.2	1.1	−0.257	.798

Nicotine Dependence (3)

All were significantly associated with the number of hagars (sessions) smoked per day. (Auf RA. et al. 2012)

- Time to the first smoke of the day
- Smoking even when ill
- Time to tobacco craving
- Hating to give up the first smoke of the day

Nicotine Dependence (4)

- Smoking and recovery phases after WTS and Cigarettes showed similarity in the way they both:
  - Suppressed withdrawal
  - Suppressed craving
- Recovery of some of these symptoms can be faster with cigarette use. (Rastam S. et al. 2011)

Nicotine Dependence (5)
Hookah smoking vs. placebo

- WT smokers completed two double-blind, counterbalanced sessions: tobacco and tobacco-free preparation (sugar cane, molasses, flavor)

- Independent of condition:
  - Symptoms of withdrawal were reduced
  - Direct effects of nicotine were increased

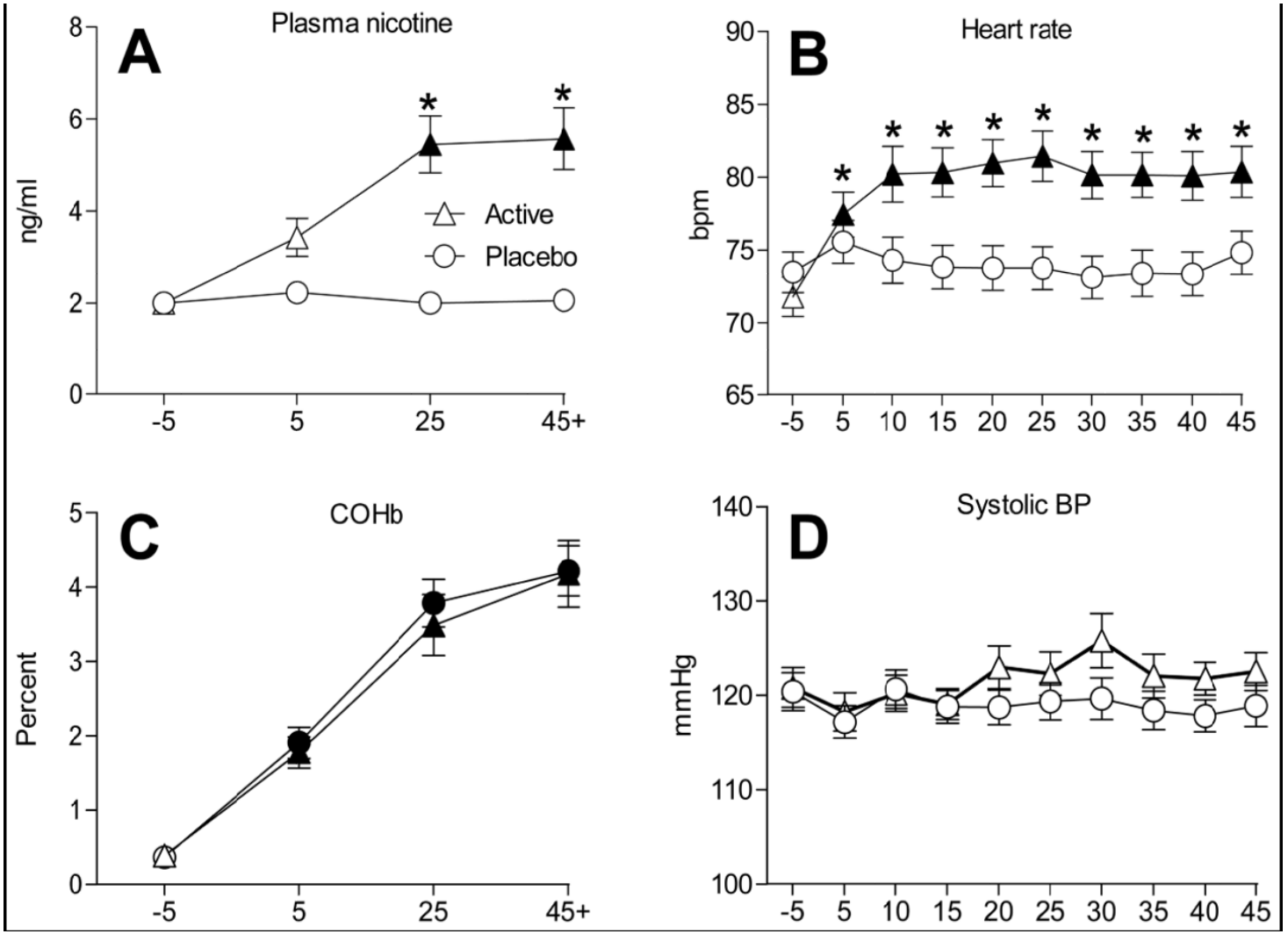


Figure 1.
Means (±1 SEM) for plasma nicotine (A), HR (B), COHb (C), and systolic BP (D) for active and placebo waterpipe tobacco conditions. The time point "45+" refers to the fact that some participants (n=12) smoked longer than the minimum 45 minute bout. Filled symbols indicate a significant difference from baseline and asterisks (*) indicate a significant difference between active and placebo conditions at that time point (Tukey's HSD; P<.05).

Lebanon Waterpipe Dependence Scale (LWDS-11)

First scale to characterize WP dependence:

Items:

- Physiological nicotine dependence
- Negative reinforcement
- Psychological craving
- Positive reinforcement

This scale was suggested and validated to be compatible with the Fagerstrom Scale for cigarette smoking. It is not simple or handy and needs to be simplified

مركز الحسين للسرطان
KING HUSSEIN CANCER CENTER

مكتب مكافحة السرطان
CANCER CONTROL OFFICE

الوقاية
الكشف المبكر
التشخيص والعلاج
الرعاية التلطيفية

Prevention
Early Detection
Diagnosis & Treatment
Palliative Care

HEALTH EFFECTS OF HOOKAH

مركز الحسين للسرطان
KING HUSSEIN CANCER CENTER

مكتب مكافحة السرطان
CANCER CONTROL OFFICE

الوقاية
الكشف المبكر
التشخيص والعلاج
الرعاية التلطيفية

Prevention
Early Detection
Diagnosis & Treatment
Palliative Care

Published by Oxford University Press on behalf of the International Epidemiological Association

International Journal of Epidemiology 2010;**39**:834–857
doi:10.1093/ije/dyq002

RISK FACTORS

The effects of waterpipe tobacco smoking on health outcomes: a systematic review

Elie A Akl,[1,2*] Swarna Gaddam,[2] Sameer K Gunukula,[2] Roland Honeine,[1] Philippe Abou Jaoude[1] and Jihad Irani[3]

مركز الحسين للسرطان
KING HUSSEIN CANCER CENTER

مكتب مكافحة السرطان
CANCER CONTROL OFFICE

الوقاية
الكشف المبكر
التشخيص والعلاج
الرعاية التلطيفية

Prevention
Early Detection
Diagnosis & Treatment
Palliative Care

The Effects of WP Tobacco Smoking on Health Outcomes

Methods:

- A systematic review using the Cochrane Collaboration methodology for conducting systematic reviews
- Rated the quality of evidence for each outcome using the Grading of Recommendations Assessment, Development and Evaluation (GRADE) methodology

The Effects of WP Tobacco Smoking on Health Outcomes

- **Included:**
  - Observational studies
  - case–control studies and cross-sectional studies) assessing the association between WP tobacco smoking and health outcomes
- **Excluded:**
  - Case reports
  - Case series
  - Outbreak investigations and abstracts
  - Studies assessing physiological outcomes (FEV1)

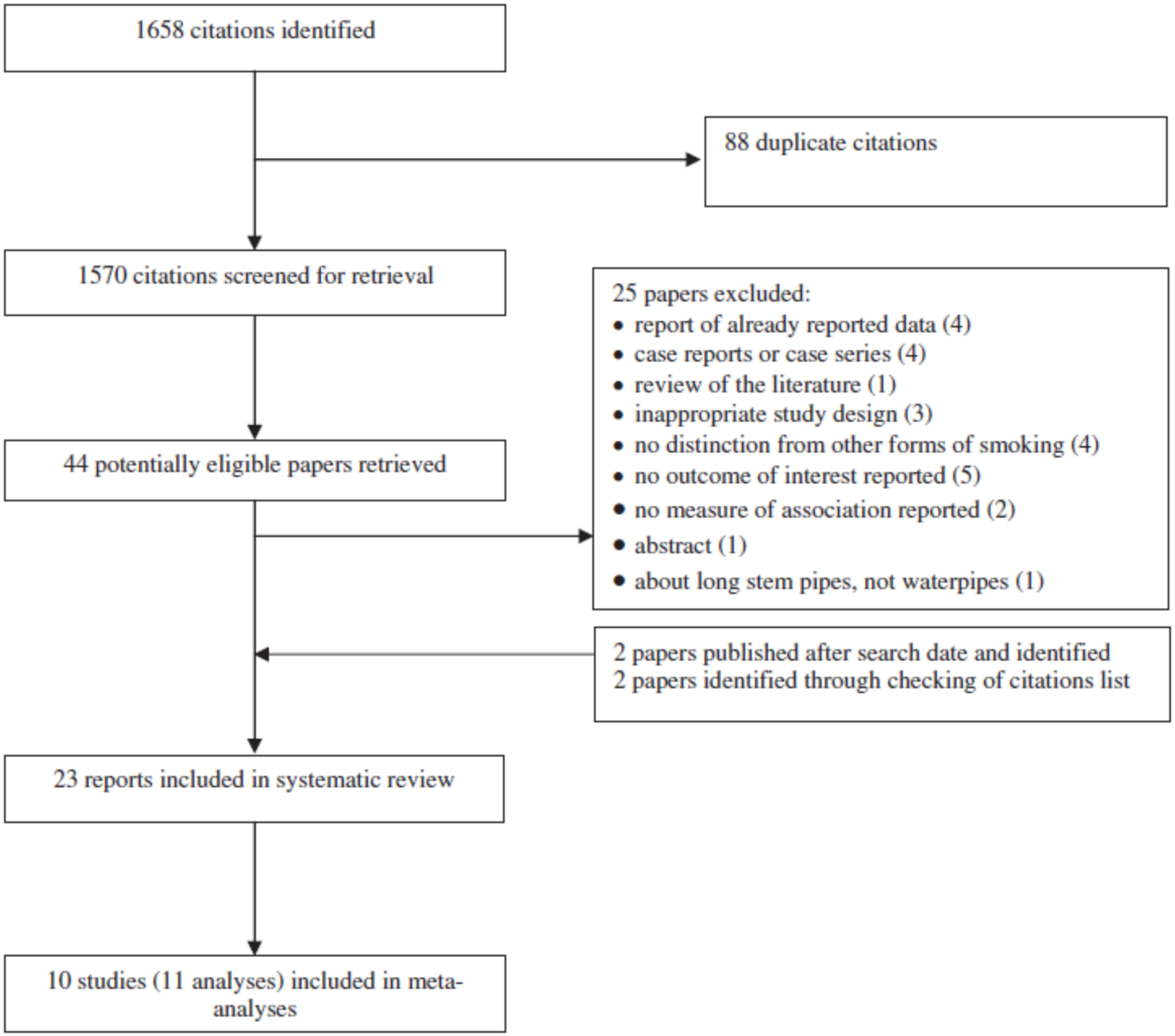


Figure 2 Study flow diagram

The Effects of WP Tobacco Smoking on Health Outcomes

Conclusions:

- **WTS was significantly associated:**
  - Lung cancer
  - Respiratory illness
  - Low birth-weight
  - Periodontal disease

- **WTS was not significantly associated with**
  - Bladder cancer
  - Nasopharyngeal cancer
  - Esophageal cancer
  - Oral dysplasia
  - Infertility
  - Hepatitis C.

The overall quality of evidence varied from very low to low.

HOOKAH EFFECT ON LUNG FUNCTION AND EXERCISE CAPACITY

Hookah Effect on Lung Function

مركز الحسين للسرطان
KING HUSSEIN CANCER CENTER

مكتب مكافحة السرطان
CANCER CONTROL OFFICE

الوقاية
الكشف المبكر
التشخيص والعلاج
الرعاية التلطيفية

Prevention
Early Detection
Diagnosis & Treatment
Palliative Care

Effects of WP Tobacco Smoking on Lung Function

Methods:

- Systematic review using the approach of the Cochrane Collaboration
- Conducted two separate meta-analyses comparing:
  - WP smokers with nonsmokers
  - WP smokers with cigarette smokers

Both comparisons for each of three spirometric measurements (FEV_1, FVC, and FEV_1/ FVC)

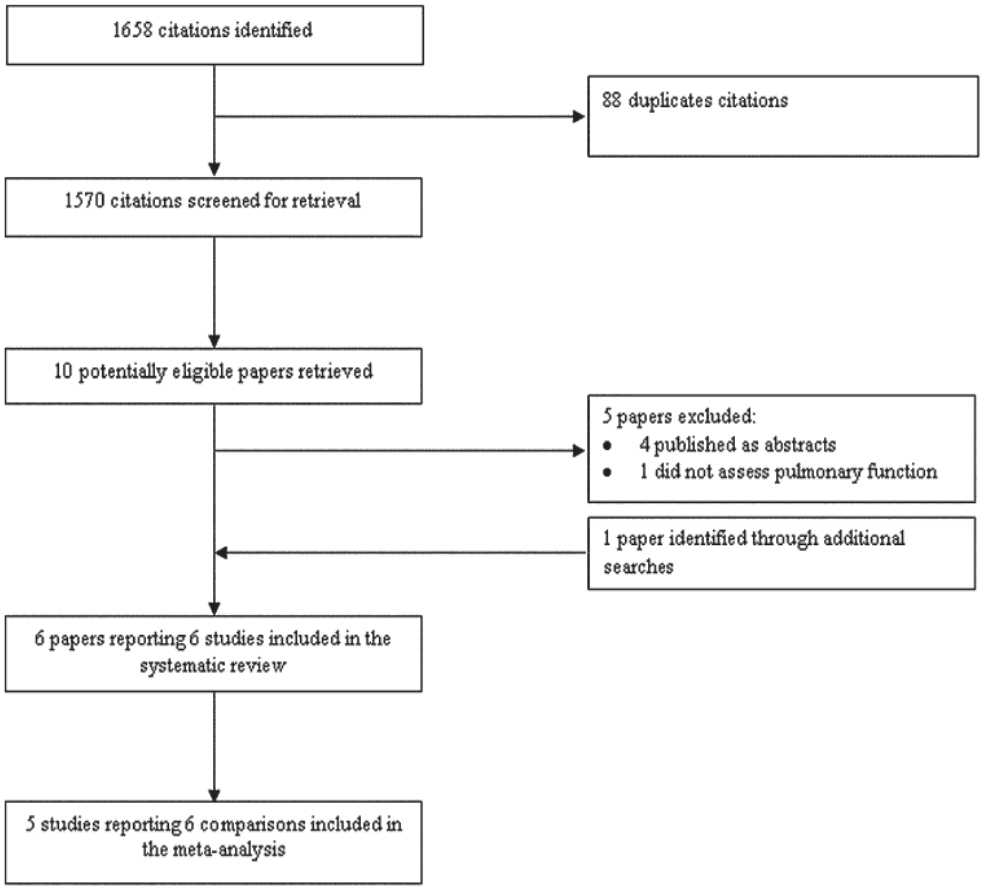


FIGURE 2. Study flow diagram.

Effects of WP Tobacco Smoking on Lung Function

Results:

WPS was associated with:

- Statistically significant reduction in FEV_1 (SMD= -0.43; 95% CI, -0.58 to -0.29; equivalent to a 4.04% lower FEV_1%)
- A trend towards lower FVC (SMD = -0.15; 95% CI, -0.34 to 0.04; equivalent to a 1.38% reduction in FVC%)
- A lower FEV_1/ FVC (SMD = -0.46; 95% CI, -0.93 to 0.01; equivalent to a 3.08% lower FEV_1/ FVC).
- Comparing WPS with cigarette smoking, there was no statistically significant difference in FEV_1, FVC, and FEV_1/ FVC.

Effects of WP Tobacco Smoking on Lung Function

Conclusions:

WPS:

- Negatively affects lung function
- May be as harmful as cigarette smoking
- Likely to be a cause of COPD

The Acute Effects of Waterpipe Smoking on Lung Function and Exercise Capacity in a Pilot Study of Healthy Participants.

Hawari FI, Obeidat NA, Ayub H et.al.
(Under review)

مركز الحسين للسرطان
KING HUSSEIN CANCER CENTER

مكتب مكافحة السرطان
CANCER CONTROL OFFICE

الوقاية
الكشف المبكر
التشخيص والعلاج
الرعاية التلطيفية

Prevention
Early Detection
Diagnosis & Treatment
Palliative Care

Study Design

- **Objective:**
  - Characterize the acute effects of WTS on lung function and exercise capacity
- **Methods:**
  - 24 healthy WP male smokers
  - A pilot single-group pre-test (abstained from WTS for ≥48 hours) post-test (within 0.5 hours of a 45-minute WTS session) design
  - Performed spirometry, DLCO and time-limited CPET (cycloergometer; 2-min 20-Watt warm-up and 25-Watt increase every 2-minutes for 10 minutes)

مركز الحسين للسرطان
KING HUSSEIN CANCER CENTER

مكتب مكافحة السرطان
CANCER CONTROL OFFICE

الوقاية
الكشف المبكر
التشخيص والعلاج
الرعاية التلطيفية

Prevention
Early Detection
Diagnosis & Treatment
Palliative Care

Table 1. Sample characteristics and changes observed after a waterpipe session

Demographic Data	**Mean (range)**	
Age (years)	20.4 (18-25)	
Average height (cm)	179.3 (169-192)	
Average weight (Kg)	80.6 (54-107)	
Average BMI (Kg/m^2)	25.0 (17.6-32.2)	
Frequency of WTS (waterpipes per week)	4 (0.5-14)	
Years of WTS	3.7 (1-7)	
Changes Following WTS session	Pre-exposure to waterpipe smoking	Post-exposure to waterpipe smoking
Carbon Monoxide Level	3.7 ppm	24.4 ppm
Average minutes of exercise time completed	9.4 min	9.2 min
Average Watts	138.6	136.3
VO_2 (L/beat)**	1.86	1.7

WTS: Waterpipe smoking

**: Significance testing was conducted for VO_2 values – significance was detected (one-sided p-value=0.03)

Table 2. Mean changes in respiratory parameters evaluated pre and post waterpipe exposure in 24 healthy males

Parameter	Pre-waterpipe exposure	Post-waterpipe exposure	P-value
FEV_1 (L/sec)	5.03	4.95	-
$FEF_{25-75\%}$ (L)**	5.51	5.29	0.042
FVC (L)	5.94	5.89	-
DLCO mL/mmHg/min	40.6	42.5	-
Baseline respiratory rate	17.7	19.7	0.0005
Borg scale at mid exercise	1.7	2.4	0.017
Borg scale at peak exercise	4.4	5.2	0.013
Breathing reserve (%)	43.88	42.54	-
VE max (l/min)	97.5	98.9	-
O_2 sat (%) at peak	96.4	96.1	-

**significant one-sided p-value (<0.05)
- Non-significant one-sided p-value

Conclusion

Acute WTS appears to induce impairment in lung function and exercise capacity. Larger studies are warranted to further characterize the nature and extent of such impairment.

Case Study

A 35 year old healthy male smokes hookah daily. He just got married 2 years ago and recently became a father of a 6 month old baby. He has an 8 to 5 office job. His wife refuses to allow him to smoke at home. He leaves to a coffee shop directly from work daily. He self referred himself after noticing that his marriage is in danger.

مركز الحسين للسرطان
KING HUSSEIN CANCER CENTER

مكتب مكافحة السرطان
CANCER CONTROL OFFICE

الوقاية
الكشف المبكر
التشخيص والعلاج
الرعاية التلطيفية

Prevention
Early Detection
Diagnosis & Treatment
Palliative Care

The pharmacological regimen that provides the best abstinence rates results for treating hookah dependence is:

1) NRT
2) NRT + Bupropion
3) NRT + Bupropion + Varenicline
4) Non of the above

The pharmacological regimen that provides the best abstinence rates results for treating hookah dependence is:

1) NRT
2) NRT + Bupropion
3) NRT + Bupropion + Varenicline
4) **Non of the above**

TDT FOR HOOKAH

مركز الحسين للسرطان
KING HUSSEIN CANCER CENTER

مكتب مكافحة السرطان
CANCER CONTROL OFFICE

الوقاية
الكشف المبكر
التشخيص والعلاج
الرعاية التلطيفية

Prevention
Early Detection
Diagnosis & Treatment
Palliative Care

Treatment Interventions - Cochrane Review

No waterpipe cessation interventions

The Cochrane Review: Interventions for waterpipe smoking cessation. 2011

Are hookah users interested in quitting?

- Interest in quitting was expressed by 28.4% of subjects
- The majority (89.2%) reported health concerns as a primary reason
- And 59.2% made an unsuccessful quit attempt in the past year

Ward KD. et al. 2005

TDT for Hookah Smokers

- Anecdotal
- Detailed patterns of use (regular vs. occasional)
- Counseling and motivational interviewing (creating interest to quit)
- Avoid comparing cigarettes to hookah (both are bad)

مركز الحسين للسرطان
KING HUSSEIN CANCER CENTER

مكتب مكافحة السرطان
CANCER CONTROL OFFICE

الوقاية
الكشف المبكر
التشخيص والعلاج
الرعاية التلطيفية

Prevention
Early Detection
Diagnosis & Treatment
Palliative Care

TDT for Hookah Smokers (2)

- **Using pharmacotherapy:**
  - NRT: dose and timing
  - Bupropion
  - Varenicline

- **Dealing with relapse**

Most large US cities ban hookah smoking in bars:

1) True
2) False
3) Do not know

Most large US cities ban hookah smoking in bars:

1) True
2) **False**
3) Do not know

RESEARCH AND PRACTICE

US Health Policy Related to Hookah Tobacco Smoking

Brian A. Primack, MD, PhD, Maggie Hopkins, BA, Cynthia Hallett, MPH, Mary V. Carroll, BA, Mitchell Zeller, JD, Kathleen Dachille, JD, Kevin H. Kim, PhD, Michael J. Fine, MD, MSc, and Julie M. Donohue, PhD

September 2012, Vol 102, No. 9 | American Journal of Public Health

مركز الحسين للسرطان
KING HUSSEIN CANCER CENTER

مكتب مكافحة السرطان
CANCER CONTROL OFFICE

الوقاية
الكشف المبكر
التشخيص والعلاج
الرعاية التلطيفية

Prevention
Early Detection
Diagnosis & Treatment
Palliative Care

US Health Policy Related to HTS

- **Objective:** Assess how a representative sample of US tobacco control policies may apply to HTS

- **Methods:**
  - Municipal, county, and state legal texts applying to the 100 largest US cities were examined

TABLE 1—Categorization of 100 Largest US Cities by Clean Air Policy Type

Policy Environment Label	Description of Policy	Cities, No.	Specific Cities[a]
Smoking legal	No comprehensive clear air legislation related to any type of tobacco use in bars	27	Jacksonville, FL; Indianapolis, IN; Fort Worth, TX; Memphis, TN; Nashville, TN; Las Vegas, NV; Oklahoma City, OK; Virginia Beach, VA; Atlanta, GA; Miami, FL; Tulsa, OK; Arlington, TX; New Orleans, LA; Tampa, FL; Pittsburgh, PA; Henderson, NV; St. Petersburg, FL; Orlando, FL; Lubbock, TX; Baton Rouge, LA; Garland, TX; Reno, NV; Hialeah, FL; Chesapeake, VA; North Las Vegas, NV; Irving, TX; Birmingham, AL
HTS exempt	Comprehensive legislation disallowing cigarette smoking in bars; however, HTS specifically exempted by name	4	Chicago, IL; Boston, MA; Albuquerque, NM; Long Beach, CA
TRE exempt	Comprehensive legislation disallowing cigarette smoking in bars; however, HTS exempted via a generic exemption for TREs or cigar bars	65	New York, NY; Los Angeles, CA; Houston, TX; Philadelphia, PA; Phoenix, AZ; San Antonio, TX; San Diego, CA; Dallas, TX, San Jose, CA; San Francisco, CA; Austin, TX; Columbus, OH; Charlotte, NC; Detroit, MI; El Paso, TX; Baltimore, MD; Washington, DC; Denver, CO; Portland, OR; Tucson, AZ; Fresno, CA; Sacramento, CA; Kansas City, MO; Mesa, AZ; Colorado Springs, CO; Omaha, NE; Raleigh, NC; Cleveland, OH; Oakland, CA; Minneapolis, MN; Wichita, KS; Bakersfield, CA; Honolulu, HI; Anaheim, CA; Aurora, CO; Santa Ana, CA; St. Louis, MO; Corpus Christi, TX; Riverside, CA; Cincinnati, OH; Lexington, KY; Stockton, CA; Toledo, OH; St. Paul, MN; Newark, NJ; Greensboro, NC; Buffalo, NY; Plano, TX; Lincoln, NE; Fort Wayne, IN; Jersey City, NJ; Chula Vista, CA; Norfolk, VA; Chandler, AZ; Laredo, TX; Madison, WI; Winston-Salem, NC; Durham, NC; Glendale, AZ; Scottsdale, AZ; Fremont, CA; Irvine, CA; Rochester, NY; San Bernardino, CA, Spokane, WA
Strict	Comprehensive legislation disallowing cigarette smoking in bars; HTS does not seem to be exempt from this legislation	4	Seattle, WA; Louisville, KY; Milwaukee, WI; Anchorage, AK

Note. HTS = hookah tobacco smoking; TRE = tobacco retail establishments.
[a]Cities are listed in order of population, from highest to lowest.

US Health Policy Related to HTS

- Three fourths of the largest US cities disallow cigarette smoking in bars
- Nearly 90% of these cities may permit HTS via exemptions
- Closing this gap in clean air regulation may significantly reduce exposure to HTS

Air Quality?

Indoor air quality in Virginia waterpipe cafes.

Cobb C et al. Tob Control 2012 Mar 24.

- A revised indoor air quality law has been implemented in Virginia to protect the public from the harmful effects of secondhand smoke exposure.
- This legislation contains exemptions that include allowances for smoking in a room that is structurally separated and separately ventilated.

مركز الحسين للسرطان
KING HUSSEIN CANCER CENTER

مكتب مكافحة السرطان
CANCER CONTROL OFFICE

الوقاية
الكشف المبكر
التشخيص والعلاج
الرعاية التلطيفية

Prevention
Early Detection
Diagnosis & Treatment
Palliative Care

Indoor Air Quality in Virginia WP cafes

Objectives:

- Examine the impact of this law on air quality in waterpipe cafés
- Compare the air quality in these cafés to restaurants that allow cigarette smoking and those where no smoking is permitted

Indoor Air Quality in Virginia WP cafes

Methods:

- Indoor air quality was assessed in 28 venues (17 waterpipe cafés, five cigarette smoking-permitted restaurants and six smoke-free restaurants (five with valid data))
- Real-time measurements of particulate matter (PM) with 2.5 μm aerodynamic diameter or smaller (PM(2.5)) were obtained
- Occupant behavior and venue characteristics were assessed

Indoor Air Quality in Virginia WP cafes

Results:

- Mean PM(2.5) concentration:
  - WP café smoking rooms (374 µg/m(3), n=17)
  - WP café non-smoking rooms (123 µg/m(3), n=11)
  - Cigarette smoking-permitted restaurant smoking rooms (119 µg/m(3), n=5)
  - Cigarette smoking-permitted restaurant non-smoking rooms (26 µg/m(3), n=5)
  - Smoke-free restaurants (9 µg/m(3), n=5)

Indoor Air Quality in Virginia WP cafes

Results (2):

- Smoking density positively correlated with PM(2.5) across smoking rooms smoke-free restaurants
- PM(2.5) was positively correlated between smoking and non-smoking rooms of venues

Indoor Air Quality in Virginia WP cafes

Conclusions:

- Air quality in the WP café smoking rooms was worse than restaurant rooms in which cigarette smoking was permitted
- State-required non-smoking rooms in WP cafés may expose patrons and employees to PM(2.5) concentrations above national and international air quality standards
- Reducing the health risks of secondhand smoke may require smoke-free establishments in which tobacco smoking sources such as WP are prohibited

Action Against Hookah Is Needed!

- Research: trends, harms, cessation, etc...
- Subject to same anti-tobacco regulations
- Health warnings
- Fight false advertisement about hookah's safety
- Cessation interventions
- HCP education about risks to vulnerable groups

مركز الحسين للسرطان
KING HUSSEIN CANCER CENTER

مكتب مكافحة السرطان
CANCER CONTROL OFFICE

الوقاية
الكشف المبكر
التشخيص والعلاج
الرعاية التلطيفية

Prevention
Early Detection
Diagnosis & Treatment
Palliative Care

Thank You

مركز الحسين للسرطان
KING HUSSEIN CANCER CENTER

مكتب مكافحة السرطان
CANCER CONTROL OFFICE

الوقاية
الكشف المبكر
التشخيص والعلاج
الرعاية التلطيفية

Prevention
Early Detection
Diagnosis & Treatment
Palliative Care