

The Health Hazards of Smoking Shisha

Summary

The use of the waterpipe, or shisha, for smoking tobacco is an old tradition in the Eastern Mediterranean Region that goes back centuries. Since the introduction of cigarettes to the Region, waterpipe smoking was generally limited to older males, usually of low socioeconomic level, in rural areas and in the older parts of cities. Since the early 1990s, however, there has been a new surge of its use in cities and among new groups such as females, young people and those from high socioeconomic levels.

There are distinct types of waterpipes with different names in different societies: for example, the *gouza bouri* (about 200–500 ml) is smaller than the *shisha* (about 1000–2000 ml), and there are other common names, such as *narghile*, *hubble-bubble* and *hookah*. They all share the structure of a small container half filled with water, which acts as a filter for the smoke drawn by suction from a funnel-shaped tobacco holder. The tobacco is usually burned by smouldering charcoal placed on top of it. The most popular type of tobacco used in waterpipes is called *ma'assel*. It is a mixture of crude tobacco fermented with molasses (black honey). Different fruit flavours are added to it (apple, strawberry, etc.). *Tombak* is just another form of *ma'assel*. *Jurak* is a different form, which is prepared by a more complicated process. It is moistened, dried and shaped before being used. Another name for it in the Syrian Arab Republic is *ajami*

Despite the new popularity of waterpipes, little information is available on the characteristics of waterpipe smoking exposure, the degree of tobacco exposure to consumers, and its impacts on health. In general, compared to cigarette smoking, waterpipe smoking is characterized by less frequent exposure (one to four sessions per day) but with a much more intense exposure per session which varies between 15 and 90 minutes. The uptake of tobacco nicotine is equivalent to 2–12 cigarettes per portion of tobacco used (Hagar). A regular user of waterpipe usually smokes several hagars per session and on average smokes 2-3 sessions per day. This translates into intake of nicotine equivalent to more than one pack of cigarettes per session for most of the users. However it is known that waterpipe smoking produce more smoke than cigarette smoking and it has been estimated that smoke exposure could be as much as 100-200 cigarettes per session. Therefore **the types and magnitudes of health hazards of waterpipe smoking are likely to be different from those of cigarette smoking**, and there is a need to standardize exposure measurements for the proper assessment of health hazards related to this particular kind of tobacco exposure

Also, compared to the typical cigarette smoker, waterpipe smokers are exposed to larger amounts of nicotine, carbon monoxide and certain other toxins. The temperature of burning tobacco in waterpipes is much lower than that in cigarettes, modifying the constituents of waterpipe smoke, and this in addition to the force needed to pull air through the high resistance of the water pathway permits the smoke to be inhaled very deeply into the lungs. **Therefore, the site and pattern of cell injury may be different than that commonly experienced by cigarette smokers.** This topic requires further toxicological and pathological investigation and needs expanded research support. Indeed, the entire field of waterpipe health effects is ripe for new and comprehensive

research, including trans-disciplinary approaches to the major questions raised in this review.

Many waterpipe users perceive that it is less harmful than smoking cigarettes and some of those trying to quit cigarettes are using the method to cut down on cigarette consumption. This false concept of “safe smoking” urgently needs to be corrected.

Health education is heavily required in this area by better informing health practitioners of the facts about waterpipe tobacco exposure, the public should be made aware that the principal carcinogenic and mutagenic components of tobacco smoke are water insoluble, and therefore are not efficiently absorbed into the water chamber of the waterpipe apparatus, as commonly believed.

National survey on waterpipe use and other risk factors for cardiovascular disease in Egypt 2002

This work examined the Egyptian National Profile for hypertension, obesity, high random blood glucose and tobacco use with a special emphasis on waterpipe smoking. It also provided the first national prevalence of obesity and waist–hip ratio norms for Egyptian adults.

A representative sample (6950 individuals) of the residents of six Egyptian governorates (of a total 27) representing governorates in both Upper and Lower Egypt participated in a household survey using a cluster sample technique. All adults above 18 years old in the household were interviewed. A questionnaire was filled out for each individual including smoking pattern, type, duration, and amount, history of hypertension and intake of medication (to treat hypertension), abnormal high blood glucose and history of diabetes mellitus type 2. Blood pressure, random blood glucose and anthropometric measurements were evaluated.

The prevalence of all forms of smoking among adult males was 47% (34% cigarettes 10% waterpipe, 3% mixed). The overall smoking rate peaked at the age groups of 40-60 years (56%). Smoking prevalence among adult females was less than 1%. Waterpipe smoking represented 24%–30% of all smoking patterns in all age groups with a peak of 16-17% between 40-60 years of age.

In the developed world, tobacco use has generally followed a four-stage model represented by two line curves: tobacco prevalence over time (100 years, 1900–2000) among males and females with a projection of tobacco-related mortality rates across the same time interval. Egypt’s smoking pattern among males is consistent with stage 2 of the model where both tobacco-related mortality and smoking prevalence is increasing. We observed a gradual decline in mean age of regular smoking initiation across different birth cohorts in Egypt, which is a characteristic of stage 2 epidemic. This entails longer lifetime duration of smoking and consequently increases the burden of smoking-related diseases. The age of initiation of waterpipe smoking continues to be higher for those born between 1950 and 1980 at 35 and 27 years of age (compared to cigarettes at 30 and 23 respectively) with a progressive decline for both waterpipe and cigarettes smoking initiation until both were 16 years for those born in the 1990s.

With regard to associations between smoking and markers of cardiovascular health, a significantly greater prevalence of abdominal obesity was observed in this study among waterpipe smokers compared to non-smokers. In general, Egyptian males seem to have a high proportion of risky abdominal obesity (> 50%) and risky waist measures (> 9%) as well as obesity (> 24%). There was also an observed significant increase in the proportion of those having systolic high blood pressure and abdominal obesity among cigarettes smokers than among non smokers.

Taking the non-smokers as the reference group, the odds of developing hypertension were calculated for different smoker age groups. Below the age of 40 years, waterpipe smokers had significantly more abdominal obesity and overall obesity than the other groups while they had non-significant higher odds of developing systolic, diastolic and overall hypertension than non-smokers or cigarette smokers.

National survey on cigarettes and waterpipe smoking in Egypt, 2005

A national household survey using a multistage, random sampling method was used to recruit household members from the general population of Egypt, to generate estimates of tobacco use prevalence. This survey covered 65 sampled districts in 25 governorates of Egypt (out of 27 total governorates). A special focus of the survey was the comparison of tobacco use in urban vs. rural areas.

The family members in each randomly selected household were classified into four categories (strata) as follows: a) males, 18 years of age and older; b) females, 18 years of age and older; c) males, between 12 and 17 years of age; d) females, between 12 and 17 years of age. We selected one person from each category whenever available, depending on random number tables. Randomly selected individuals were interviewed about the smoking habits using a standard questionnaire. A salivary cotinine test strip was used to validate the self-reported smoking habits.

Among males 18 years and older, 13.6 % (95% CI 10.3–17.8) and 10.5% (95% CI 7.0–15.4) in rural and urban areas respectively, stated they were current shisha smokers at the time of interview (any day during the four weeks prior to interview day). Ever-tried smoking waterpipe rates were 16.8 % and 24.4% in rural and urban areas, respectively. This translates into 1.18 and 0.9 million current waterpipe smokers in rural and urban areas in Egypt, respectively. Overall, among males 12- 18 years old, 3.7% stated that they currently smoke a waterpipe.

The average age at the time that shisha was first tried was stratified by age group and sex. The younger age group currently started waterpipe smoking 10 years earlier (14.4 ± 2.7) than older smokers (24.6 ± 9.6). It is very well shown that there is a 10- year earlier shift for first trial of waterpipe smoking among those younger than 18 years, which will add 10 years to the lifelong duration of tobacco use and could be reflected in related increase in smoking associated morbidity

Among adult males prevalence of shisha smoking increased by age from 9.1 % among those 18-19 years of age to 15.5-17.1 % among those 20-30 years of age. Levels of 20-26% were seen in older age groups between 40-55 years

Limitations of this study

Interpretation of these findings presented should consider the preliminary nature of these results. The final results are not yet available. The country representation of the sample will be examined and some statistical adjustments to the national prevalence figures for tobacco use will be available with the final results.

Epidemiology of shisha smoking in the rural areas of the Nile Delta

The aim of this study is to investigate the prevalence of waterpipe smoking (*shisha*, as named in Egypt) among rural Egyptians and to define the determinants of shisha smoking in these areas.

We studied the epidemiology of waterpipe (shisha) smoking in nine randomly selected villages households in the Nile Delta in Egypt (10000-20000 residents). All household members (12 years and older) of randomly chosen houses were invited to participate.

The average response rate was 86% in the nine villages. Adults (18 years and above) totalled 10,161 participants, of whom 49% were male and 51% were female. A total of 2,358 subjects, between 12 and 17 years old, participated (51% male and 49% female).

Among 4,994 interviewed adult males, 34% were current cigarette smokers, 9% current shisha smokers and 1% was currently smoking both products. The overall smoking rate was 44% on average and ranged from 20-60%. The peak was in the age group 40-50 years of age.

Waterpipe smoking rate was less than 1% among 18-20 year olds, and it increased to 16% among those 50 years and older.

Waterpipe smoking was significantly higher among less educated rural Egyptian men especially those divorced and widowed (28%). Those with no school education had a 15% prevalence rate of waterpipe smoking compared to university educated rural residents with only 5%.

Water pipe smoking was minimal (around 0.5%) among females.

A steady decrease in the mean age of smoking initiation in successive birth cohorts were observed among cigarette and waterpipe smokers. Among older males born between 1920-1930 the mean age of initiation for waterpipe was 26-28 years , while among those born in the 1980 and above the mean age of initiation dropped to 16 years.

Waterpipe smokers believed that waterpipe smoking is less hazardous than cigarette smokers. More than 70% of waterpipe smokers smoke in presence of their children at home and are used to smoking around their wives as well (this translates

into 70% of kids and wives at home are exposed to indoor environmental tobacco smoke) .

In spite of the fact that the majority of waterpipe smokers were willing to quit (85%) and thought they would quit whenever they like, rather few of them (14.5%) tried to quit during the year before the survey.

Comparison of cigarette and waterpipe smoking among female university students in Egypt

Current smoking behavioural practices among female university students in Egypt are not well known. A better picture of current smoking behaviour among them, and their knowledge, attitudes and beliefs about tobacco, might be obtained by surveys conducted within establishments such as cafés, where they feel more comfortable discussing smoking than at home with family members present.

An anonymous, self-administered questionnaire was therefore distributed during 2004 in nine waterpipe cafés serving coffee, tea, cold drinks, snacks and waterpipes. These establishments were located in the vicinity of two universities, Cairo University and Sixth of October University. A total of 100 female medical students attending Cairo University and 96 female undergraduate science students from Sixth of October University participated in the study. As the responses of the participants did not differ significantly between the two universities, all subjects were grouped together for the analysis reported here. Nearly one third of these female students (27%) reported smoking cigarettes exclusively, while 37.8% smoked tobacco using waterpipes exclusively, and 35.2% used both types of tobacco smoking methods.

Around half of the studied females (48%) reported absence of their father from home and 20% did not have their mothers at home.

Among the salient observations from the survey are the following points:

- 16% of those who used waterpipes had a waterpipe at home
- The mean age at initiation of the smoking habit was 17 years for cigarette smokers and 18 years for waterpipe smokers.
- 18% reported an increase in the amount smoked since the previous year.
- Most of the subjects were encouraged to start smoking waterpipes by a female friend (61%), while 36 % had an introduction by a male friend.

Among the reasons given for smoking waterpipes instead of cigarettes were:

- The perception of the waterpipe as fashionable (21%),
- The belief that waterpipes are less harmful than cigarettes (20%), and
- The desire to be with friends in the cafés.

A large proportion of students (61%) thought that they can stop smoking anytime, while only 30% reported having quit attempts in the past. However only a third had a quitting attempt lasting for more than one month. The major motivating factors for quitting were health concerns (71%), the expense of smoking (40%), and religious beliefs (31%).

Successful interventions for young men and women should address the misconception that waterpipes are harmless and glamorous and focus efforts to reduce its attractiveness.

Behavioural and biological aspects of waterpipe smoking in Egypt

This section describes the profile of waterpipe smoking in Egypt and elsewhere focusing on tobacco behavioural and biological aspects.

Interplay between social factors and waterpipe smoking

In spite of the rapid modernization and urbanization in Egypt, smoking continues to be more prevalent among males than females. Social norms in Egyptian society regard smoking among females as an unacceptable behaviour. However many young females in Egypt (of high social class and highly educated) are starting to smoke waterpipes. This may alter the social norm of the Egyptian community. Also studies in the Syrian Arab Republic and Lebanon showed unexpectedly high numbers of females smoking waterpipes..

Heavy metal exposure and waterpipe

Tobacco is a source of lead. Measurement of mean lead content in the water (in 12 waterpipes) and 12 cigarette filters before and after smoking, revealed higher levels of lead in the water than in cigarette filters. The authors of the previous study worked in a laboratory environment. In real life, smokers do not change the water with each *korsi*, especially in cafés. Further studies are required on the filtering capacity of water.

Biological indicators of waterpipe smoking

Two main indicators of tobacco use are identified: carbon monoxide (CO) which is a primary output of burning tobacco and charcoal in waterpipe, and cotinine which is the direct metabolite of nicotine. An experimental controlled study observed that plasma nicotine and cotinine rose significantly from 1.1 ng/ml and 0.8 ng/ml to 60 ng/ml and 52 ng/ml, respectively, after smoking a waterpipe for 48 minutes. Another study showed that smoking one *hagar* increased carboxyhaemoglobin levels significantly more than smoking one cigarette from baseline levels (4% compared with 2%). **Together, the previous work in this area suggests that exposure levels to toxicants in tobacco smoke may be higher for waterpipe smokers than for cigarette smokers under some conditions, but clearly more work is needed to further characterize these differences.**

Health hazards associated with waterpipes

Not surprisingly, the respiratory system is the primary target of the adverse impacts of the smoking habit. Waterpipe smokers have to inhale more deeply than do cigarette smokers. Also, the time of exposure for a single use of waterpipe is about 50 minutes compared with 5 minutes for a cigarette. The waterpipe smokers have to take puffs more frequently in order to keep the charcoal hot, unlike cigarette smokers, who may take few puffs from a single cigarette. These dynamic factors of waterpipe smoking were thought to produce smaller airway function reduction than cigarette smoking.

Waterpipe smokers are liable to repeated infections due to lowered immunity and the habit of sharing waterpipes (sometimes without even changing the mouthpiece).

Tuberculosis is one of the re-emerging diseases in Egypt. The humid closed hose may act as a source of tuberculosis infection among public waterpipe users. The common use of one waterpipe, usually among consumers with low understanding of symptoms like cough and expectoration, is a possible risk factor for cross-infection

Waterpipe smoking and physiological dependency

No reliable dependency scales for waterpipe tobacco smoking have been developed that are comparable to the well validated instruments available for cigarette smoking dependency. New comprehensive validation studies are needed in this region to fill this gap of knowledge.

The micronucleus test in buccal mucosa cells for assessment of the genotoxicity of waterpipe smoking

One of the most rapid and efficient techniques to study the impact of environmental and life-style factors on genetic stability in human populations is the micronucleus (MN) test. MN in exfoliated human oral cells are small intranuclear DNA structures separated from the main nucleus of the basal epithelial layers and are exfoliated into the oral cavity. The average reported healthy population MN frequency is 1–3 per 1000 cells. Increases in the MN frequency in exfoliated oral cells have been observed as a result of exposure to cigarette smoking.

This study tests the hypothesis that waterpipe smoking increases MN levels in exfoliated oral cells relative to MN levels in the oral cells of those who have never smoked. Secondly, we aimed to determine the extent to which this cytogenetic damage is influenced by the smoking behaviour (intensity, duration, morning smoking and inhalation of waterpipe smoke).

In this study, 149 current adult male (18 years of age and above) waterpipe smokers (who smoked waterpipe at least once per week and had smoked fewer than

100 cigarettes in their lives) and 78 male never smokers (never tried waterpipe or cigarettes in their lives) were enrolled.

Participants completed a questionnaire and provided buccal smears for MN scoring. At least 1000 intact epithelial cells per individual were scored to calculate the average percentage of micronucleated cells.

The current study revealed that the mean MN was significantly higher (more than twofold) among waterpipe smokers as compared to never smokers. There was no statistically significant increase in MN with increasing the number of hagers smoked. Also no significant differences in MN levels were found according to typical addiction indicators including the duration of smoking, minutes to the first use of waterpipe in the day, smoking even when ill, or inhaling the tobacco smoke into the chest.

Thus in conclusion, waterpipe smoking increased the frequency of MN due to possible genotoxic action of substances present in the waterpipe tobacco smoke. Extensive studies and standardization tests to quantify the tobacco exposure by waterpipe smoking are recommended to help in the evaluation and quantification of the biological damage at different levels of exposure to waterpipe smoking.