Waterpipe tobacco smoking

Authors: Mohammed Jawad, Andy McEwen, Ann McNeill & Lion Shahab
Editors: Andrew Preston, Melanie McIlvar, Andy McEwen

This briefing is based upon an article in the journal *Addiction*[1] and has been prepared by the NCSCT to provide stop smoking practitioners with a summary of the evidence and guidance on the information they can give to their clients.

Executive summary

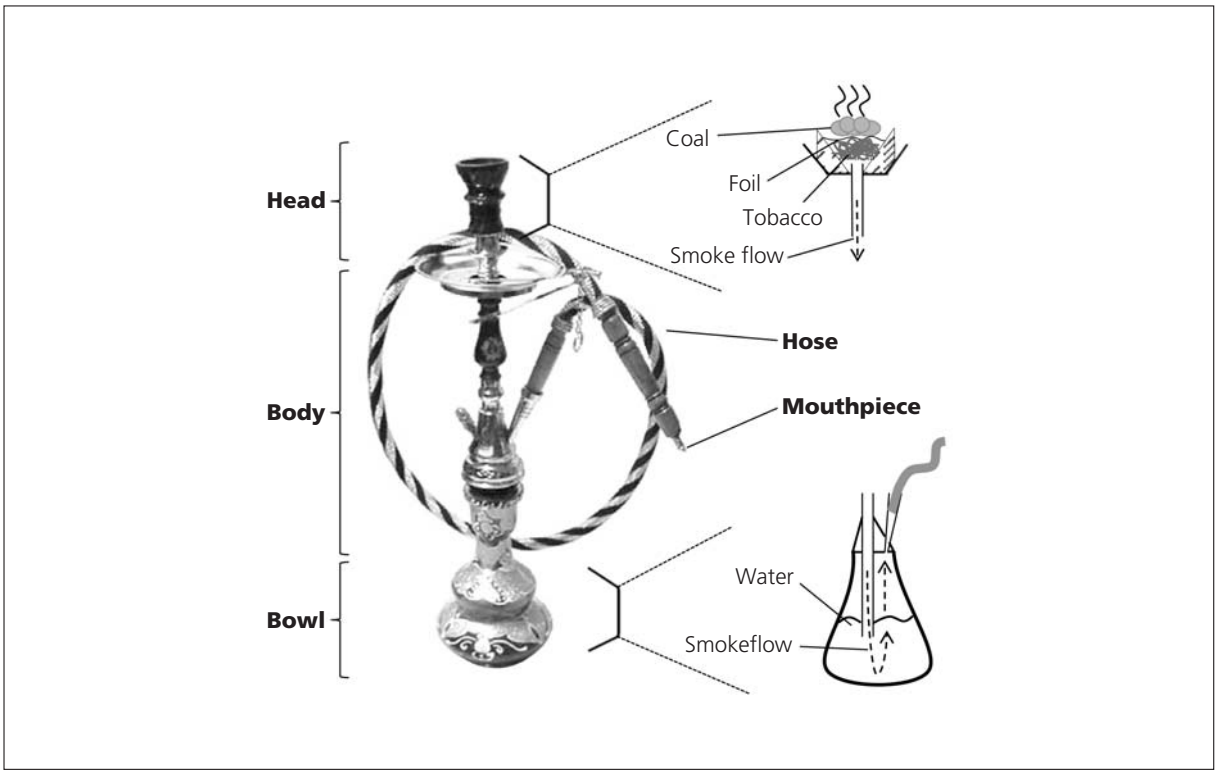
- Waterpipe tobacco smoking is increasing and the UK has reported a 210% rise in the number of waterpipe cafes nationwide over the last five years.
- Despite a widespread belief amongst waterpipe tobacco smokers that it is a low risk activity, waterpipe tobacco smoke is known to contain significant levels of toxins including some which are known to be carcinogenic (i.e. causes cancer).
- There is evidence of significant negative health effects from waterpipe tobacco smoking.
- Waterpipe tobacco smoking therefore represents both an individual health issue for clients attending stop smoking services, and a potential public health concern.

Waterpipe tobacco smoking

Waterpipe smoking: history and practice

Waterpipe smoking is a broad term given to a device whereby smoke (usually sourced from a tobacco mixture) is passed through water prior to inhalation.[2]

Figure 1: Example of a waterpipe with schematic[1]



The origins of waterpipe tobacco smoking are thought to date back several centuries, although its exact beginning is uncertain.[3]

There are a variety of cultural and regional variations in its use, thus it is synonymously known across the world by other terms such as hookah, shisha, narghile, goza or hubble bubble.[3] This range of cultural names is partly reflective of the different types of tobacco used.

The most commonly used waterpipe tobacco is called the *Mo'assel* which means 'honeyed' and is made up of about one-third tobacco mixed with two-thirds honey and fruit flavours.[4] It is separated from heated coal in the waterpipe by pierced aluminium foil.

There are also unflavoured waterpipe tobacco forms known as *Ajami*, *Tumbak*, or *Jurak*, which may have a higher tobacco ratio, and be in direct contact with the heated coal[4] in waterpipes.

Waterpipe tobacco smoking

The Chinese variant of waterpipe contains very little tobacco, and no coal.[5] More recently the waterpipe industry has marketed two new variants: firstly, a non-tobacco, herbal variant, claiming to provide a healthier alternative to the *Mo'assel* tobacco[6], and secondly electronic waterpipe devices attempting to emulate e-cigarettes.[7]

Understanding these differences is important when critiquing the available evidence on the health effects of waterpipe use, as each type of tobacco mixture has a different smoke composition of varying concentrations with slightly different health effects.[8]

Most of the recent literature generally refers to the fruit-flavoured *Mo'assel* type, and it is this type of waterpipe that is discussed in this briefing, unless stated otherwise.

Unlike cigarettes, a waterpipe is commonly smoked intermittently and in groups.[9–12] It provides a central activity at social gatherings, and is usually smoked for 45–60 minutes[13], but sometimes longer.[14]

The United Kingdom has reported a 210% rise in the number of waterpipe cafes nationwide over the last five years;[15] a regular location for smokers. However, smoking is also commonplace in the home[11,12,16,17] as this is considered cheaper and less time consuming.[18] Waterpipe tobacco use can be associated with other forms of substance abuse, most commonly cigarettes but also recreational drugs,[9,19,20–23] with reports that narcotics and alcohol can be mixed with the waterpipe tobacco and water respectively to add to its psychoactive effect.[18,24]

Prevalence and epidemiology

Currently good epidemiological trend data on waterpipe smoking is lacking, in part due to the absence of its inclusion in national health surveys.[25]

The full picture is further complicated by the fact that waterpipe users do not generally self-identify as smokers[26] resulting in a tobacco-using population that healthcare professionals are not able to routinely identify.[27]

Whilst males are more likely to smoke waterpipes than females,[28] this gender difference is smaller than that seen for cigarette use, especially in countries where there is a usual gender divide in cigarette use.[29] There is no clear trend on socio-economic status predicting waterpipe use, but it may be more prevalent among the more educated and affluent.[30–32]

Recent longitudinal data suggests an upwards trend which persist across all age groups, but is particularly noticeable in the younger population. In the UK the current prevalence is thought to be 8% amongst school pupils[33] and 8–19% amongst university students.[25,34,35]

Health consequences of waterpipe tobacco smoking

Controlling for the extensive habitual variables of waterpipe smoking such as breathing patterns, size of the waterpipe,[36] and materials used,[37] has proven difficult when conducting smoke aerosol studies using machine-replicated human behaviour models.[38]

However, there has been consistency in the production of significant noxious chemicals including tar, nicotine, carbon monoxide, nitric oxide and various carcinogens.

Attempts have been made to compare these toxicant yields to the amount produced by a single cigarette. Interestingly, despite being marketed as a healthier alternative, it is shown that herbal variants of waterpipe contain significant levels of toxicants, except for nicotine, similar to normal waterpipe *Mo'assel*.

Additionally, one study has shown that waterpipe tobacco delivers substantial amounts of heavy metals including arsenic, beryllium and chromium graded 1 (which is carcinogenic) by the International Agency for Research on Cancer.[39]

Waterpipe tobacco is known to contain and deliver other carcinogens, e.g. concentrations of radionuclide elements such as uranium, and polonium[40,41] and tobacco-specific nitrosamines, but in lower amounts than seen in cigarette smokers.[42]

A key health concern, in the acute setting at least, is the threat of CO poisoning[43–50] where smokers generally experience non-specific neurological signs such as light headedness and nausea.[11] Waterpipe smokers usually recall a 'buzz' when smoking, which may reflect the early stages of CO poisoning.[51]

The carbon monoxide in waterpipe tobacco smoke results from the combustion of coal, which is why CO levels are high, even when replacing the tobacco with herbal variants. In addition, the burning of coals or 'natural coals' (such as those made from coconuts) also produces significant levels of carcinogenic polycyclic aromatic hydrocarbons (PAHs).[52]

Chronic exposure to CO may have implications in maintaining blood oxygenation, a concern for surgeons and anaesthetists,[53] and is a risk factor in itself for cardiovascular disease.

A final potential health threat, created from the sharing of waterpipes in close proximity between users, is the possibility of infection transmission, in particular tuberculosis,[54] but other organisms have been shown to exist inside the waterpipe apparatus.[55]

Waterpipe tobacco smoking

A review of the literature concluded that waterpipe smoking can result in levels of up to ten cigarettes' worth of nicotine among daily waterpipe smokers.[56]

Although studies on the health effects of waterpipe tobacco smoking tend to be lacking or of low quality, various detrimental health effects from waterpipe smoking have been established.

A recent systematic review could not rule out associations with:

- bladder cancer;
- nasopharyngeal cancer (cancer of the upper throat);
- oesophageal (gullet) cancer; or
- infertility[57]

High carcinoembryonic antigen levels (CEA) levels, implicated in the spread of cancers, have also been documented amongst waterpipe smokers.[58]

Further evidence shows similar effects of waterpipe tobacco smoking and cigarette smoking on lung function[59,60] and waterpipe tobacco smoking has also been implicated in the development of chronic obstructive pulmonary disease (COPD).[61]

Although there is relatively little evidence in the way of long-term health effects on the heart, acute effects of waterpipe tobacco smoking include increases in heart rate and systolic/diastolic blood pressure[62–64] as well as impaired baroreflex (the mechanism for regulating blood pressure) sensitivity.[65] Moreover, 'herbal' waterpipe use can also contribute to such impairment of pulse and blood pressure.[66]

Waterpipe tobacco smoking

Dependence and cessation

As waterpipes can deliver levels of nicotine similar to cigarettes, levels which are considered to lie above the 'addiction threshold',[67] we can conclude that waterpipe tobacco smoking has the potential to induce dependence.[56]

However, the pattern of dependence is likely to be different from that of cigarettes. It is likely to be shaped by the different mechanisms of delivering nicotine, social context,[12,68] and sensory cues (aromatic smell, flavoured taste, decorative sight, bubbling sound), as well as different individual smoking behaviour and waterpipe tobacco brand preference[69] to that of cigarettes.

Furthermore, waterpipe tobacco smoking has been shown to suppress recognised nicotine withdrawal symptoms and cravings in smokers, and so has the ability to undermine cigarette smoking cessation attempts.[70,71]

In response to the growing body of evidence that regular waterpipe smokers may display or report signs of addiction,[67,72–75] a validated waterpipe-specific scale to address dependence has been established,[76] which may be of use to services working with waterpipe users. Among waterpipe café smokers in London nearly half showed signs of dependence, which was associated with Arab ethnicity, daily waterpipe smoking in the past, and longer waterpipe smoking sessions.[77] It should be noted however that this scale is likely to need re-validation for appropriate future use in a Western population.

For those who have wanted to stop their waterpipe use, common motivating reasons include health reasons,[78,68] yet some waterpipe smokers quit in order to smoke cigarettes instead.[78,70]

However, the lack of evidence on waterpipe cessation is exemplified by a recent Cochrane review that identified no interventions in the literature and thus the potential use of effective treatments for cigarette dependence, such as nicotine replacement therapy (NRT), remains unproven.[79] The only evidence for waterpipe cessation can be found from a study in Pakistan which showed that either behavioural support or behavioural support plus seven weeks of bupriopion therapy, may be effective cessation methods among waterpipe tobacco smokers.[80]

Waterpipe tobacco smoking

Advice for waterpipe tobacco smokers

Healthcare professionals are in an excellent position to provide information and effective advice, particularly on cessation, for waterpipe users.

In the absence of specific guidelines for the treatment of waterpipe tobacco smoking, and some (limited) evidence of deleterious health effects of waterpipe smoking, it would seem reasonable to adopt the precautionary principle.

Health promotion advocates who engage with the general population or with media should aim to become comfortable and confident when speaking about waterpipe smoking. This is especially true for youth workers and anyone who interacts with young people, given the high and increasing prevalence of waterpipe smoking in this age group. One common pitfall is numerically comparing waterpipe tobacco smoking to cigarette smoking, like-for-like. Several media outlets report that waterpipe tobacco smoking is equivalent to smoking 100 cigarettes or more, however this is not the case and health promoters should avoid potentially confusing numerical comparisons.[81]

Asking specifically about waterpipe smoking during consultations where appropriate, will provide an opportunity to advise or refer for cessation support.

A greater desire to quit is seen amongst those given health information compared with those who received no information,[82] and all health professionals should inform waterpipe users about the potential health risks, and continue to advocate a message of 'no combustible tobacco use in any form' as part of both general health promotion, and in addition to providing tailored support to smokers.

It is also recommended that local stop smoking service providers include waterpipe smoking in their treatment protocols.

Waterpipe tobacco smoking

Regulation

The waterpipe industry operates relatively freely and there is considerable scope for better legislation and regulation.

There are strict regulations in the US on prohibiting flavoured cigarettes (except menthol), which has not been extended to other forms of tobacco including the waterpipe.[83] Moreover, waterpipe tobacco packaging does not routinely display adequate or relevant health warnings, being non-compliant with the packaging requirements of the World Health Organisation Framework Convention for Tobacco Control (FCTC).[84]

In addition, health warnings are seldom seen on the websites of waterpipe retailers[85] and their marketing strategies are grossly misleading.[86] It is worrisome that nicotine labelling on waterpipe Mo'assel tobacco packaging does not correlate with nicotine delivery,[87] that herbal waterpipe variants deliver as many toxicants to the user as ordinary waterpipe tobacco and that electronic waterpipes have reached the market,[7] all claiming to reduce harm.

A result of this marketing freedom has been the rise in the number of waterpipe cafes.[15] It is likely that increased accessibility to these venues may encourage initiation,[82] especially around educational establishments[16,33] where regular use of these cafes has created suggestions that they serve a community purpose for young people to safely meet, gather, and 'stay out of trouble'.[19]

We believe that waterpipe tobacco smoking legislation should, at a minimum, be placed on par with cigarette smoking.

Waterpipe tobacco smoking should be taxed accordingly to discourage purchase, and packaging that is non-compliant with the FCTC should be prohibited. As commercial waterpipe venues do not traditionally display waterpipe tobacco packages to their customers (the pipe is provided pre-packed with tobacco), salient pictorial health warnings should be visible on the apparatus and related accessories.

Notes

The main limitation we have faced in drafting this briefing is the lack of reliable and good quality evidence in the literature, especially on the subject of cessation which is the main driver for public health interventions.

In addition, the review is limited by the fact that there is no singular waterpipe product. Many different forms exist each with their own history and method of action, factors which are likely to influence its impact on health, beliefs and attitudes associated with its use, as well possibly requiring specific and different interventions to reduce both use and harm.

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