

# Water pipes, ‘bongs’ and ‘hookahs’: What does the evidence say about harms?

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Cannabis may be ingested in a number of ways, but the most popular route of administration continues to be via smoking or inhaling the drug. Cannabis products are usually smoked (with or without tobacco) either through a pipe or in the form of a cigarette (often referred to as a ‘joint’). The pipes come in a vast array of sizes and forms but often have long stems or incorporate a ‘hookah-type’ water filtration system (i.e., water pipe) and are often known as a ‘bong’. When a water pipe is used, cannabis smoke is cooled by the water in an effort to reduce its harshness and temperature, which can scald the throat (Booth, 2003).

Little research has been conducted into the specific harms associated with smoking cannabis via a water pipe or bong. Few studies examining cannabis use, apart from those relating to the medical use of the drug, have differentiated between the various methods of delivery (i.e., smoking via joints or water pipes, ingesting in food) and little is known regarding distinct administration routes, their relationship to drug use patterns, and related harms.

In recent years, there has been a resurgence in popularity in the use of hookahs or ‘shisha’ to smoke tobacco, particularly flavoured tobacco products. The ancient Middle Eastern water pipe is now widely smoked across the world, particularly by students and young adults. Due to the use of healthy-sounding fruit flavouring and the social way it is usually used (i.e., in restaurants and cafes), it is often regarded as a ‘safer’ alternative to cigarettes. As a result of this recent popularity, there has been an increasing amount of research conducted examining the harms associated with the use of the shisha.

This bulletin will examine the origin of the water pipe and what we know about the harms associated with smoking cannabis via a bong, particularly when compared to other routes of administration. As the research is limited in this area, an examination of the current evidence regarding the harms associated with water pipe tobacco smoking is included along with consideration of how this information can be used in cannabis prevention activities.

## Origins of the water pipe

The use of water in a smoking apparatus is ancient, with Persian hookahs or ‘narghiles’ illustrative examples of early smoking water pipes (Erickson, Jarvie & Miller, 1977). In their 1997 US patent for an ‘improved smoking water pipe or bong’, the authors describe the process as follows – “... smoke from the substance being combusted is directed through a tube discharging below the surface of water in a potlike container before passing therefrom through a second tube to the mouth of the smoker.”

Where the water pipe actually originated is unclear, although there is increasing evidence to suggest that bongs were first used to smoke cannabis in Africa. Based on the archaeological evidence available at the time of writing, Phillips (1983) hypothesized that cannabis was smoked in water pipes in eastern and southern Africa

before the introduction of tobacco. He believed that the discovery in Ethiopia of water pipe bowls, “definitely associated with the smoking of cannabis”, tends to confirm speculation of an African origin of the water pipe. Others believe they originated in China or Persia, but in these cases the instruments were believed to be used to smoke tobacco.

The word ‘bong’ is an adaptation of the Thai word *baung*, which refers to a cylindrical pipe or tube cut from bamboo. One of the earliest recorded uses of the word in the West is in the McFarland Thai-English Dictionary, published in 1944, which describes one of the meanings of ‘bong’ in the Thai language as, “a bamboo water pipe for smoking kancha, tree, hashish, or the hemp-plant.” Erickson and colleagues (1977) believe that it is this version that has probably influenced the design of the modern devices that incorporate a “general cylindrical tubular construction”, with tubes of plastic and other modern materials replacing the hollow bamboo stem that was used in the past. Their description of how this type of water pipe works is as follows:

*“The oriental bong, further, provides means for using atmospheric air to dilute the smoke before inhalation, as well as provided oxygen for the combustion producing the smoke. Thus, an air admitting orifice has been provided venting the smoke chamber formed in the bamboo stem above the water in the bottom of the stem. The orifice is finger controllable, so that air may at the desire of the smoker be either excluded or admitted directly to the smoke chamber so as to dilute the smoke therein.”*

A bong used to smoke cannabis is similar to a traditional hookah in both construction and function, except it is usually smaller and more portable. The hole in the stem described above, often referred to as the ‘carburator’, ‘shotty’ or simply ‘hole’, is usually kept covered during the smoking process, then opened to allow the smoke to be drawn into the respiratory system in an attempt to maximize the impact.

## **Use of cannabis and the water pipe in Australia**

A bong has been described by an Australian Government body as, “a device capable of being used for administering an illicit drug by drawing smoke or fumes as a result of heating or burning the drug in or on the device, through water or another liquid in the device”, (Queensland Government, 2007). These devices, available in a wide range of sizes and designs, were bought and sold legally across the country until 2007.

Since that time, most jurisdictions (including NSW, Victoria, Queensland and WA) have introduced legislation that has made the display and sale of bongs illegal. What appeared to prompt this legislative change was growing concern around the use of methamphetamine in Australia, with legal changes around the display and sale of bongs usually made in conjunction with laws that also made the sale of glass pipes used to smoke crystal methamphetamine (or ‘ice’) illegal (Queensland Government, 2007).

In August 2011, the Victorian Parliament passed an amendment to the *Drugs, Poisons and Controlled Substances Act 1981* that made the display and sale of bongs illegal in that state. Interestingly, under the new legislation, the display (for sale) of water pipes that are used to smoke tobacco products, such as hookahs, remained legal, although restricted to no more than three (Victoria State Government, 2013).

Some of this legislation has since been amended. For example, in late 2012, South Australia passed the *Summary Offences (Drug Paraphernalia) Amendment Bill* to address a loophole that had allowed people to continue to purchase bongs, even though laws had been introduced in 2007 to make them illegal.

Australian research into the use of cannabis has routinely collected information about the preferred and/or usual route of administration and it would appear that bongs continue to be a popular way of using the drug.

The most recent Australian National Drug Household Survey (NDHS) questioned respondents about their methods of using cannabis but the results were not included in the main report (AIHW, 2011). In 2007, however, recent cannabis users (those that had used in the previous 12 months) reported they were more likely to smoke the drug as a joint/reefer/spliff (84.3%), followed by smoking in a bong or pipe (81.7%) (AIHW, 2008).

Bongs are the most common method of using cannabis among Australian secondary school students, according to the 2011 ASSAD Survey. Fifty-eight percent of males and 50% of females, who identified as having used cannabis in the past year, reported this was their usual route of administration (White & Barilola, 2011). Interestingly, regular cannabis users were more likely to report using a bong than occasional users who preferred to smoke a joint.

It is also important to remember that most Australian cannabis smokers do not smoke the drug by itself, rather mixing it with tobacco, whether they choose to use joints or bongs. According to the 2008 NDHS, almost two thirds (64.8%) of recent users combined cannabis with tobacco (AIHW, 2008). This is similar to numbers in the UK, where it has been estimated that 70% of cannabis users smoke with tobacco (Bennett, 2008). This is believed to be done to either ‘bulk-up’ the cannabis, assist with burning, or to increase the ‘high’.

## **Harms associated with smoking cannabis**

The major advantages of inhalation or smoking of cannabis from a user’s perspective are fast onset of action and easy titration of dose, while the major disadvantage is often regarded as the potential damage smoking causes to the respiratory tract (Grotenhermen, 2001). Research with cannabis smoke has revealed that, except for their respective psychoactive components (i.e., nicotine and cannabinoids), the smoke produced by combusting both, share many common constituents and physical properties (Cozzi, 1995).

Unfortunately, there is a widespread perception that smoking cannabis is relatively free from harm, particularly when compared to tobacco. In their 2003 Position Paper for The Thoracic Society of Australia and New Zealand, Taylor and Hall summarized the evidence in this area, taking differing levels of consumption into account, and outlined four distinct harms which regular cannabis smoking may cause to respiratory health. These were as follows:

The constituents of cannabis and tobacco smoke include a similar range of pro-inflammatory and carcinogenic substances (Level 1)

The histopathological effects of cannabis smoke inhalation are similar to those of tobacco smoke (Level 1); although premalignant histological changes may also occur, there are few data as yet to confirm that cannabis smoking causes malignancy in the respiratory tract (Level 3)

Acute exposure to cannabis smoke results in small decrements in lung function accompanied by respiratory symptoms (Level 2)

With longer-term exposure, tobacco and cannabis smoking have additive effects of lung function and respiratory symptoms (Level 2)

Put simply, evidence “strongly suggests that smoking cannabis will result in a similar range of adverse effects in the lungs to that of tobacco smoking” (p. 310, Taylor & Hall, 2003).

# Respiratory harms associated with smoking cannabis via a water pipe

Considering the popularity of smoking cannabis via a water pipe, or bong, it is surprising how little research has been conducted on this route of administration and the potential respiratory harms associated with the practice.

Some users believe that bong smoking reduces the exposure to potentially toxic materials, due to the smoke being filtered by the water. In fact, a 1998 UK House of Lords Cannabis Report proposed a hierarchy of risk and stated that water pipes or bongs “may have advantages (over other routes of administration) since the smoke will be inhaled at a cooler temperature and some tars may remain suspended in the water” (Bennett, 2008).

This has since been disproved, with a number of studies finding that bongs do not provide this protection. In their review of the respiratory effects of cannabis, Taylor and Hall (2003) address the claim that the use of a bong reduces exposure to potentially toxic materials and state that “there appears to be no significant reduction in risk with this modified inhalation technique. Indeed, the relative amount of tar being delivered to the airways (expressed as a proportion of inhaled THC) is similar.”

The most significant study providing information on the harms associated with bong smoking was partly sponsored by the National Organization for the Reform of Marijuana Laws (NORML) (Gieringer, 1999). Researchers tested the smoke from seven different sources – joints, bongs and vaporizers. There were three water pipes used in the study – a standard bong, a small portable device with a folding pipestream and a battery-operated model with a motorized paddle that mixed the smoke with the water. The study looked at two components of the smoke – tars (waste by-products of burning) and cannabinoids (compounds distinctive to cannabis including THC, as well as CBN and CBD) and aimed to determine the efficacy of various smoking devices at reducing the concentration of tars relative to cannabinoids.

The findings of the study were highly controversial when they were released, particularly amongst cannabis users, as the results showed that contrary to popular belief, using a bong did not appear to protect smokers from the harmful tars in cannabis smoke as was widely believed. Gieringer wrote that the reason for this is “water pipes filter out more psychoactive THC than they do other tars, thereby requiring users to smoke more to reach their desired effect.”

Of the three bongs studied, the pipe that mixed the smoke with water scored by far the worst. This led the authors to conclude that water filtration is actually counterproductive because water appears to absorb THC more readily than tars.

Due to the recent interest in the medical use of cannabis around the world, there have been an increasing number of studies that have sought to examine the possible adverse effects resulting from specific routes of administration. Smoking continues to be the most common delivery method with regards to therapeutic administration, as research has found that smoked cannabis acts faster than when it is swallowed. Alternatives ways of delivering the drug continue to be investigated in an effort to reduce respiratory damage while maintaining rapid action.

Grotenherman (2001) discusses a range of risks associated with smoking cannabis, including a higher tar yield from cannabis smoke (unfiltered cannabis cigarettes compared to filter-tipped tobacco cigarettes). This suggests that other routes of administration (i.e., rectal, sublingual and transdermal) could be used as alternatives to the two most common forms of ingestion if the drug was to be used for medical purposes, therefore reducing some of the possible risks identified with eating or smoking cannabis.

## Other harms associated with smoking cannabis via a water pipe

Although limited, there have been a few studies of recreational cannabis users (i.e., non-medical users) that examined patterns of use and related harms, other than simply respiratory problems.

One such study questioned 390 secondary school students in France about their frequency and preferred method of cannabis use (Chabrol, Roura & Armitage, 2003). They also assessed cannabis dependence and found that the rate of dependence among bong users was significantly higher than among joint users. The authors concluded that this finding may mean that bong use contributes to dependence and/or that dependence leads to using stronger methods, such as the bong.

A recent Swiss study examined the prevalence rates of different cannabis delivery methods and drug use patterns, including the relationship of the mode of delivery with problematic cannabis use (Baggio et al., 2013). It found that diversification in routes of administration (i.e., the more ways users reported using cannabis – joints, bongs, eating in food) can be associated with heavier illicit drug use. The strongest association was observed for water pipe users, with ‘water pipe with tobacco’ linked to both problematic cannabis use and illicit drug use, and ‘water pipe without tobacco’ showing the greatest correlation with problematic cannabis use. The authors noted their finding of an association between bongs and problematic cannabis use was consistent with Chabroul’s and colleagues (2003) water pipe link to dependence.

## Use of tobacco and the water pipe in Australia

As the prevalence of cigarette smoking decreases in many parts of the world, including Australia, evidence suggests that water pipe tobacco smoking (WTS) use is on the rise (Akl et al., 2011). The United States has noted a particular increase in use among adolescents and college students, with evidence suggesting between 10-20% of some young adult populations are current water pipe users (Cobb et al, 2010). Known by many names across a range of cultures (hookah, shisha, goza, narghile and hubble bubble), WTS is a centuries old tradition that is particularly associated with Arabic societies and the Middle East. It involves heating the tobacco using charcoal, filtering the resulting smoke in a bowl of water and directing it to a rubber pipe for inhalation.

Cobb and colleagues (2010) state that the most popular type of water pipe tobacco is called maasel (also known as shisha tobacco). They describe this as a “wet mixture of tobacco, sweetener, and flavourings.” Water pipe products are sold in tobacconists across Australia, but anecdotal evidence suggests smokers are increasingly using one of the many online stores dedicated to the promotion and sale of shisha products, including pipes and the smoking mixtures (usually referred to as ‘shisha’) to access these products. Shisha.com.au is one Australian online store that sells what they refer to as ‘tobacco-free shisha’. Their page titled ‘Shisha Flavours’ states the following:

*“If you are looking to buy high quality tobacco-free shisha for your hookah or shisha pipe then you have come to the right place. We have Australia’s best online price for Soex shisha with an amazing selection of flavours from double apple to mint choc chip! ... A lot of shisha comes with tobacco and other chemicals. Our shisha is all from natural flavours and contains no tobacco, tar or nicotine but still has all the buzz and strong flavours.”* (2014) <http://shisha.com.au/shisha-flavours/>

There were no questions asked in the 2010 National Drug Household Survey on the practice of smoking tobacco via a hookah or water pipe. Smokers reported smoking one type of tobacco, with manufactured cigarettes the most common (63.2%, down from 69.4% in 2007), followed by roll-your-own (5.9%, up from

4.9% in 2007) and cigars/pipes (1.6%) (Figure 3.3) (AIHW, 2011). We know little about the practice of water pipe tobacco smoking in Australia, but anecdotal evidence suggests that it is increasing in popularity.

## **Water pipe tobacco smoking and evidence on harms**

Similar to bong smokers, many tobacco water pipe smokers believe this method of smoking is less harmful and addictive than cigarettes, once again mainly due to the perceived benefits of filtering the smoke via the water (Cobb et al, 2010).

Surprisingly, even though WTS has been around for a long time, the health effects of this route of administration have not been as clearly documented as those for cigarettes. That said, there is growing evidence of the harms associated with this method of smoking, with a recent systematic review finding that WTS was significantly associated with lung cancer, respiratory illness, low birth weight and periodontal disease (Akl et al, 2010). Cobb et al (2010) added to these concerns by suggesting that water pipe tobacco smokers, like cigarette smokers, are at risk for nicotine/tobacco dependence and cardiovascular disease, as well as cancer.

Dugas et al (2012) stated that it has been difficult to estimate the equivalence between cigarette and WTS in terms of respiratory harms and emphasizes that it very much depends on how equivalence is measured. That said, they provide two examples that are often quoted in health promotion material on the topic. Firstly, a single water pipe session might be equivalent to smoking two cigarettes for a non-daily water pipe user or 10 cigarettes for a daily water pipe user. The second, from a World Health Organization report, suggests that water pipe use is equivalent to smoking 100 cigarettes in a 200 puff session.

An example of how this information is translated into health promotion material is taken from a UK charity, Cardio Wellness, who work with Asian groups to highlight a number of health issues, including shisha smoking.

*“The WHO has announced that a single session of smoking Shisha which takes up approximately 45 minutes to 1 hour, yields nicotine intake equivalent to more than one pack of cigarettes, and the Shisha smoker inhales as much smoke as a cigarette smoker would inhale consuming 100 or more cigarettes.”* (2014)

<http://www.lung.org/associations/charters/northeast/assets/pdfs/programs/msb/shisha-leaflet.pdf>

In recent times there has been growing concern that WTS represents a potential public health concern, with public health experts from across the world suggesting that further research is required to fill gaps in the literature (Jawad et al, 2013). There is also a need for evidence-based health promotion campaigns to be developed to equip the public to make informed decisions about water pipe use (Van der Merwe et al, 2013; Dugas et al, 2010).

## **Why look at water pipe tobacco smoking when considering cannabis prevention?**

This paper deals specifically with harms related to the route of administration used, i.e., the smoking of cannabis, and more specifically, harms associated with water pipe or bong smoking. Many of the harms identified are similar no matter what substance is smoked, whether it be cannabis or tobacco. It is important to note, however, that patterns of use may differ depending on the substance and the user (e.g., a cannabis dependent bong smoker compared to an occasional hookah smoker who does not smoke cigarettes) and this may have an impact on the harms.

There has been little research conducted on the harms associated with bong smoking, although this is changing as interest grows in the therapeutic use of cannabis and different methods of delivery are being investigated. At the same time, due to growing numbers of people becoming water pipe tobacco smokers, public health experts are urging more research be conducted in this area.

It is surprising that although cigarette, hookah and cannabis use are all smoking behaviors that adversely affect the health of many, there has been little research that examined the possible relationship between the three.

Fielder and colleagues (2013) attempted to fill that gap by conducting a study that investigated the temporal sequence of hookah, cigarette and cannabis use in an effort to help inform smoking prevention efforts. A prospective study of first-year US college women, found pre-college hookah use predicted initiating/resuming cigarette use; pre-college cannabis use predicted initiation of hookah tobacco smoking; and pre-college cigarette use predicted neither hookah nor cannabis initiation.

These findings highlight the co-occurrence of smoking behaviors, with the authors stating that there is a need to bundle preventive interventions so that they address all types of smoking: hookah, cigarette and cannabis.

## Conclusions

Water pipes have been used to smoke tobacco and cannabis for many years. Unlike cigarette smoking, water pipe tobacco smoking appears to be on the increase in many parts of the world, particularly amongst young people, while bong smoking continues to be popular amongst cannabis users. Regardless of the specific harms associated with the use of a particular substance, the evidence is clear that the inhalation or smoking of both tobacco and cannabis is to be avoided and the respiratory harms associated with this route of administration cannot be overstated.

It would also appear that there are unique harms, not solely linked to respiratory damage, associated with the use of water pipe devices.

It is important, therefore, if we hope to prevent cannabis use and associated harms, that we not only look at providing evidence-based information on the substance, but also the route of administration. Although limited, the evidence is clear that using a bong is one of the most harmful ways of using cannabis. At the same time, as water pipe tobacco smoking grows in popularity, it is vital that health promotion messages are developed that highlight the harms associated with smoking any substance. These messages also need to challenge the commonly-held belief that the water in the device somehow filters out the toxic materials contained in the smoke.

Some cannabis users refuse to believe their drug of choice can cause harm, instead regarding it as a 'natural herb'. Developing prevention messages that highlight the dangers associated with the devices used to smoke the drug could be an effective way of reaching this difficult group.