

## Unveiling The Hidden Hazards: Waterpipe Smoking and Its Impact on Health

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## Review

Use of the waterpipe is increasing daily by all ages and sexes. Since waterpipe smoking came to the west, especially among young adults, it has become a global trend [1]. It has gained its popularity worldwide especially in western countries due to media and celebrities. There is a coolness factor attached to smoking a waterpipe [2]. The Middle East has experienced a rise in WTS use, regardless of the fact that many individuals in the region think it is against religious law to smoke tobacco in any form [3]. Women are growing more attracted to shisha because it carries a cultural connotation in the Middle East and because smoking cigarettes is frowned upon in eastern society [4]. It has more of a cultural and social value, and people seem not to know that the waterpipe is a form of tobacco use which can lead to detrimental health effects.

WTS smoking has not been studied nearly as much as cigarette smoking. The public perception is that WTS is harmless. As with other forms of tobacco use, the use of the waterpipe can be regulated if there is more awareness of its health effects. This knowledge will be vital to curbing the widely spreading global epidemic [3]. The First International Conference on Waterpipe tobacco Smoking: Building Evidence for Intervention and Policy was held in Abu Dhabi of the United Arab Emirates on October 21-23, 2013. Hundreds of scholars who gathered from all over the world to address the issue concluded that the health effects of waterpipe

smoking generally, and especially on the oral cavity, are not well documented in the available literature and that waterpipe use must be regulated like other forms of tobacco use. There seems to be a debate whether cigarette smoking or WTS is more harmful. The question is whether WTS is as harmful if not more harmful than cigarettes. Most studies done in the past have been Knowledge, Attitude, Behavior studies or sociodemographic collection of data. Very few studies have compared the health effects of cigarette and shisha smoking, let alone the effects on lungs, which will be the primary target [5].

The waterpipe or shisha of the UAE and the hookah of India consist of head, body, water body and a hose to which a pipe is connected and from which the smoke enters the mouth. tobacco is kept on the head and is covered by aluminum foil, above which a burning coal is placed which indirectly heats the tobacco. The smoke generated then passes through water body before being inhaled into the mouth using the pipe [6]. Different regions have different names for waterpipes. In the Indian subcontinent, it goes by the name hookah, while in the United Arab Emirates (UAE), it is known as shisha. Terms like shisha, boory or goza are used in Egypt and Saudi Arabia. Now that it has become a global epidemic, Western countries like to call it the —hubble bubble [3]. Along with terminology there is a huge regional variation in Shape, Size, Appearance and Tobacco smoked.6 For the past twenty years or so, any variety of instruments that involves tobacco smoke going

through water before inhalation have been referred to as “waterpipe tobacco smoking” (WTS) in the English-language scientific literature in order to avoid any confusion [7].

In the context, “waterpipe” and “shisha” are used interchangeably. Waterpipes have existed for more than five centuries in the east, especially in India. Hookah smoking might have originated in India, where it was originally called as narjil or narghile and was used to smoke cannabis/hashish. It is thought to have spread to other places through trade like Turkey, Afghanistan, Persia and Africa, where it stayed and became a house culture [8]. A narjil is a type of coconut that is found on the Indian subcontinent. The indigenous people removed the inner flesh of the coconut, pierced the shell and placed a straw in it, thereby making the most primitive waterpipe. They would even mount it on silver framework to enhance the appearance [9]. The waterpipe reached Egypt via the Ottomans of Turkey during occupation and was called gouza/goza. The Turks were also instrumental in introducing tobacco smoking into the Middle East and Africa via Egypt. After the Turkish glass industry revolution in the sixteenth and eighteenth centuries, glass was used in the manufacture of the shisha body, which completed its evolution to its current form after the Ottomans added a clay bowl above the head and a mouthpiece at the end of the hose [10]. The popular name in the Middle East, shisha, probably came from hashish, the drug added to the tobacco. Shish/sheesh also means glass in Persian, which might also have had a regional influence on its name [8]. The use of the waterpipe is increasing daily among all age and sex groups [1]. Adolescents who cannot enter bars due to age restrictions are indulging in the unregulated shisha cafes, which give them the same ambience and social gathering. Shisha use is not so painful to the pocket either, which is another favorable factor for its use [7]. There is a coolness factor attached to smoking waterpipe. Because cigarette smoking is a taboo in the society for females, women are increasingly gravitating towards this [3].

Maassel or moassel, introduced in the 1990s, is tobacco mixed with honey or any sweetener plus flavouring agents like mint, apple, vanilla, etc. Maassel, by simplifying the process of waterpipe preparation, might have played a significant role in waterpipe popularity [11]. Marketing strategies include the introduction of modified tobacco products with —low tar on the packages, implying a reduced risk of smoking. Such strategies are encouraging the perception that waterpipe tobacco is safer tobacco [12]. The process of making ma’assel, that involves additives like honey, glycerin, and other flavors, somewhat decreases the amount of nicotine in each gram of flavored tobacco. However, these additions led to the plasma nicotine level to rise by 20% [13]. When compared to cigarette smoking, waterpipe smoking, (a) is done less often (a few times a week); (b) involves a longer exposure per session, which could easily be an hour or longer compared to the two-minute exposure of cigarette; and (c) involves a higher intake of nicotine and smoke (the equivalent of 100 to 200 cigarettes per session) [14].

Attitudes and beliefs regarding waterpipe use the perception that the product is less risky thrives in the Western market, which is a reason for the waterpipe suddenly being popular. 30% of smokers in a study in Syria and 21% of smoking subjects in Egypt believe that waterpipe is harmless or less harmful than cigarettes [15]. Smoking might not be a taboo in Western societies, but this is the case in Eastern countries. WTS is trending among females in the region because of the positive perception of the society when compared to cigarette smoking. It carries a traditional and cultural value, and their perception is that it looks attractive! [16].

Components of Waterpipe smoke the amount of carbon monoxide in WTS varies according to the size and type of charcoal and tobacco used. Some combinations might produce similar levels (0.38– 0.41%), and some yield a substantially greater amount of carbon monoxide than cigarettes (1.36–1.40%) [17-19]. Under puff topography, the list of toxins, heavy metals and other dangerous components are listed. Nicotine-free, dry particulate matter (tar) from a single waterpipe use amounts to what is seen in approximately 20 cigarettes. The temperature at which the tobacco is heated might have a positive role when it comes to tumorigenicity and mutagenicity related to tar [20]. Free radicals, which are a known cause of malignancies and tissue injuries, are elevated in the peripheral blood neutrophils of waterpipe smokers [13,14]. Environmental exposure Children are the future, so it is extremely disturbing to see images and videos of them smoking waterpipes at their homes with their parents! Since the shisha is commonly smoked in homes, children are vulnerable to the effects of passive smoking. A high incidence of respiratory disease has been found in children exposed to environmental tobacco smoke in Lebanon [21]. The social practice of sharing the same device and mouthpiece among family and friends is a sure way to transmit communicable diseases like tuberculosis [5]. A study in Egypt demonstrated that the humid, closed hose and repeated use of devices that are not sanitized properly may act as a source of tuberculosis infection among public waterpipe users [10].

Documented health hazards of Waterpipe Although evidence related to the waterpipe is very small when compared to cigarettes, it is hypothesized to have similar effects either by direct contact or indirectly through the metabolites. It can be huge risk factor for all tobacco-related problems such as lung cancer, oro-oesophageal cancers, cardiovascular disease and adverse pregnancies. WT smokers must inhale more deeply than cigarette smokers which, in combination with longer duration (50 minutes compared with five minutes for a cigarette), is the largest cause of concern. The charcoal has to be kept hot and burning via more frequent puffs compared to few drags of from a single cigarette [22,23]. This combination of factors might lead to reduction in airway function. Smoke inhaled by waterpipe reaches the lung carrying highly toxic and mutagenic substances, thereby making it a primary source of lung-tissue injury, breathing difficulties and lung cancer. The

American Lung Association has termed WTS the emerging deadly trend [24].

A Boskabady study carried out in Tehran discovered that WTS patients' lung function was similarly affected by lung inhalation smoke, as were their coughing and chest tightness when compared to users who smoke cigarettes [25]. Nicotine addiction is prevalent in smokers who use cigarettes and hookahs. The association between hookah smoking and periodontal disease, cancer of the mouth, cancer of the lungs, high blood pressure, and other cardiovascular problems has been established by Restivo's research. Additionally, since they share mouthpieces and the organisms in the biofilm spread via the water body, they are more susceptible to communicable diseases [26]. Health-related quality-of-life scores are affected by smoking in population surveys. Smoking results in bad oral hygiene due to the accumulation of plaque and calculus, stains, gingivitis, periodontitis, smoker's melanosis, keratotic patches, black hairy tongue, stomatitis nicotina, erosions on palate, delayed wound healing, oral dysplastic lesions and even malignancy—especially when synergized with alcohol [1, 27, 28, 29]. NNAL{4-(methylnitrosamino)-1-(3-pyridyl)-1-butanol} was discovered to be higher in cigarette smokers than in waterpipe smokers in a study by Ghada et al [31]. Study conducted in the American University of Sharjah showed the presence of human carcinogens naphthalene and Benzene [30, 31].

Another molecule found in WPSC is indene, a polycyclic aromatic hydrocarbon found in coal smoke. In addition, 3-ethoxy-4-hydroxy-benzaldehyde, 1,3-dimethyl-benzene, benzyl alcohol, docosane, ethylbenzene, 3-ethoxypropionaldehyde, and 2,3-dihydro-3,5-dihydroxy-6-methyl-4H-pyran-4-one—are known to irritate the skin, eyes, and respiratory tract. Numerous of the compounds found have been shown to interfere with and influence the activities of the central nervous system. These include nicotine, benzyl alcohol, ethyl cyclohexane, 1,3-dimethyl benzene, and ethyl benzene. Furthermore, it is known that benzaldehyde, 1,3-dimethyl benzene, and 5-hydroxymethyl furfural can harm DNA [32]. These valid analysis offers the answer to the question whether waterpipe induces cancer or not. The carcinogenic effects of waterpipe must be taken seriously to reduce the morbidity and mortality caused by a preventable etiology like waterpipe smoking. Water pipe smoking has a greater likelihood to result in periodontal disease than cigarette smoking, according to a study [1]. There seemed to be an increased number of missing teeth associated with longer years of smoking.<sup>33</sup> Evidence from a study suggests that shisha users have significantly altered oral microbiota. Waterpipe smokers' subgingival areas showed a higher incidence of *Candida albicans* in addition to the presence of *Acinetobacter* and *Moraxella* species [10].

The exfoliated cells of the mucous membrane in the mouth not only come into direct contact with the carcinogens in the smoke, but they will also undoubtedly exhibit the smoke's systemic effects. According to a study, WPS could have genotoxic effects on the oral mucosa and, depending on its frequency and duration, could eventually result in carcinogenicity [3]. A case of white lesion was also reported by the same authors in a person who was smoking shisha for 14 years.<sup>1</sup> In Kashmir, smoking hookah, a type of WTS, has been linked to lung cancer in a study by Koul,PA and colleagues. [34]. El Hakim, has suggested that WTS causes squamous cell carcinoma of the oral cavity and has a detrimental impact on general health [35]. A study in Sudan on the sputum of waterpipe smokers demonstrates a significant presence of cytological atypia and metaplasia, which may eventually develop into precancerous or cancerous lung lesions [36].

In a study done by Rania et al, has demonstrated that it is not just the normal lung cells which could be affected by the WPS. In this research, WPSC treatment resulted in a dose-dependent decrease in the number of cells proliferating in non-small-cell lung cancer cells, and at higher doses, it triggered cell death. The WPSC concentration of 0.5% triggered apoptosis and cellular senescence in cancer cells. WPSC renders lung cancer cells more susceptible to DNA damage and cellular senescence [37]. It has also been shown that human waterpipe smokers' blood shows an inflammatory reaction when they smoke [38]. The chemokine CCL2 regulates inflammatory responses and plays a role in tumor growth and metastasis, while IL-1 $\beta$  promotes invasiveness and is an important mediator of inflammation [39, 40]. Pro-inflammatory cytokine IL-6 serves essential roles in epithelial-mesenchymal transition [41]. Tumor aggression is determined by a combination of mechanisms, including stem cell-like characteristics and epithelial-mesenchymal transition. The fact that epithelial-mesenchymal transition produces cells with stem cell characteristics is well known [42]. All the results translate to the fact that tumor microenvironment of a NSCLC can get worsened if the patient continues to smoke shisha thinking it is causing no harm like cigarette.

## 2. Conclusion

There is enough evidence to show the genetic damage caused by WPS on Lung and Oral mucosa. Further molecular studies should be undertaken to establish the pathways involved in incidence of Lung cancer/ Oral cancerous lesions associated with WPS. Once these molecular pathways are established, more strategies of primary prevention may be implemented to curb this ominous rise in its popularity.

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