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Association between tobacco waterpipe smoking and head and neck conditions

A systematic review

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Worldwide, tobacco use causes more than 5 million deaths annually, and current trends suggest that tobacco use will cause more than 8 million deaths annually by 2030.[1,2] It is well known that cigarette smoking is harmful for overall health, and the global trend for its use is either stable or declining in countries with high income levels but still increasing in countries with low income levels.[1] Unfortunately, there is also an upward global trend for some other forms of tobacco consumption, such as waterpipe smoking (WPS).[3] WPS is a traditional form of tobacco consumption that originated in India 400 years ago and later spread to the eastern Mediterranean region.[1,4] There, it was modified to its current form. Worldwide, the waterpipe used for tobacco smoking is known by various names such as hookah, hubble-bubble, shisha, nargileh, arghileh, and goza. Initially, the tobacco smoked through the waterpipe did not contain any additives. In the past decade, flavored tobacco, also known as shisha or maassel (tobacco combined with flavoring and sweetener), was introduced.[4,5] This tobacco comes in various flavors such as strawberry (and other fruit flavors), cotton candy, and spiced chai.

WPS, especially with the addition of flavored shisha, is becoming increasingly popular among youth in several parts of the world.[3,6] The lifetime prevalence of WPS in the Eastern Mediterranean region ranges from

ABSTRACT

Background. With the growing popularity of waterpipe smoking (WPS), it is important to understand how WPS may impact health. The aim of this study was to systematically review the literature to identify potential health effects of WPS, specifically on the head and neck region.

Types of Studies Reviewed. The authors systematically reviewed published articles that focused on WPS and head and neck conditions identified from the following databases: PubMed and MEDLINE, PsycInfo, and Google Scholar.

Results. The authors included 20 articles in the review. Ten of the articles pertained to oral tissue outcomes, 7 to head and neck cancer, and 3 to the voice and middle ear. The authors found that WPS was associated with greater inflammation, *Candida*, periodontitis, dry socket, blood chromium and nickel levels, premalignant lesions, oral cancer, esophageal squamous cell carcinoma, attic retraction, edema in the vocal cords, and lower habitual vocal pitch and voice turbulence index.

Conclusions and Practical Implications. WPS is associated with various head and neck conditions. Educational and policy approaches may be required to limit the spread of WPS and its potentially deleterious effects.

Key Words. Waterpipe smoking; craniofacial; head and neck health; systematic review; tobacco; flavored tobacco; precancerous lesions; cancer; periodontitis.

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6% to 34% among 13- to 15-year-olds,[7] whereas the lifetime prevalence of WPS in the United States ranges from 7% to 20% among university students.[8] The results of laboratory studies show that a typical WPS session can last from 20 to 80 minutes, during which the smoker may take 50 to 200 puffs, which range from approximately 0.15 to 1.0 liter of smoke per puff.[9] A typical cigarette smoking session, on the other hand, lasts approximately 5 to 7 minutes, with approximately 40 to 75 puffs per session, and the smoker inhales 0.5 to 0.6 liters of smoke per cigarette.[2] Therefore, a waterpipe smoker may inhale the equivalent of 100 cigarettes or more in 1 session.[1,2,9]

Investigators have conducted a number of studies regarding WPS and its long-term effects on health. The results of systematic reviews and meta-analyses conducted in 2010[10] and 2014[11] show that WPS is associated with a risk of experiencing lung cancer, chronic obstructive pulmonary disease, other respiratory illnesses, bladder cancer, coronary artery diseases, and low birth weight. We were unable to identify any systematic reviews or meta-analyses focusing on conditions, diseases, or both, that occur in the head and neck region. We identified 3 articles that focused only on oral health outcomes, and we noted that none of these articles focused more broadly on head and neck health, areas that are also of relevance to dental practitioners.[12-14] Rastam and colleagues[12] hypothesized the potential pathophysiology of oral cancers among waterpipe users on the basis of the tobacco carcinogenesis process. Warnakulasuriya[13] described and commented only on the oral tissue findings of the investigators of a previous systematic review that had focused on WPS and its effect on overall health. Shah and colleagues[14] provided information on the effects of WPS on oral health and recommended cessation interventions for waterpipe smokers.

The aim of our review was to systematically review the literature to identify the potential health effects of WPS on the head and neck region. The authors of numerous studies suggested that cigarette, cigar, and pipe smoking are some of the main risk factors for periodontitis, precancerous lesions in the oral cavity and vocal cords, as well as head and neck cancers.[15,16] Hence, we hypothesized that WPS would be associated with conditions of the head and neck tissues such as dry socket, periodontitis, precancerous lesions, and head and neck cancers.

METHODS

Search strategy. For our search strategy, we used the following terms in combination with the word "health": waterpipe, hubble-bubble, shisha, narghileh, arghileh, hookah, and goza. We considered studies for inclusion only if the study's investigators assessed any association between WPS and health conditions seen in the head and neck region (that is, oral cavity, larynx, pharynx, vocal cords, and middle ear). We excluded from our review studies whose investigators did not distinguish between WPS and other forms of smoking, studies whose investigators did not report any measure of association, and studies whose investigators did not publish the results in English. We searched for articles published from 1990 (when the first article about WPS was published) to March 2014. We used 3 databases (that is, PubMed/MEDLINE, PsycInfo, Google Scholar) and 2 sources of gray literature (that is, www.greynet.org, www.greylit.org). We also e-mailed the Society for Research on Nicotine and Tobacco listserv (www.srnt.org/mem_only/list/index.cfm) to identify any additional unpublished data. We checked the bibliographies of included studies and relevant review articles to uncover studies that the electronic databases did not identify. Using the aforementioned methods, we identified 220 citations in our database search. We identified no additional citations using the gray literature search or the listserv request. The first author (T.M.) reviewed all of the 220 abstracts to see if the studies assessed any association between WPS and health outcomes in the head and neck region. The results of this review reduced the number of eligible studies to 20 studies.[17-36]

Data abstraction and coding. The first author (T.M.) and a trained research assistant independently coded the data. These 2 raters agreed on 82% of codes and resolved any disagreements by consensus. These 2 Rammah Mreviewers independently extracted data using specifically designed data coding forms. We used the following variables for coding: year of publication; geographic location of the study; participant characteristics (sex and age); sample size; type of smoking (for example, cigarette smoking, smokeless tobacco, WPS); WPS duration; WPS frequency in runs per days, per weeks, or per years; type of study design (for example, case report, cross-sectional, case-control); and details on the health outcomes reported (for example, vertical bone defects, dry socket).

RESULTS

Overview. Studies were mainly observational and conducted mostly in Middle Eastern, Asian, and North African countries (for example, case-control [n = 10],[18,25-27,29-32,34,35] cross-sectional [n = 7],[17,19-24] experimental [n = 2],[33,36] and case report [n = 1][28]). We further categorized these citations by bodily region and disease type as follows: oral tissues (n = 10),[17-25,36] head and neck cancers and precancers (n = 7),[26-32] and others that focused on the voice, larynx, and middle ear (n = 3).[33-35] Health conditions reported were gingivitis,

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ABBREVIATION KEY. ESCC: Esophageal squamous cell carcinoma. **MPT:** Maximum phonation time. **VTI:** Voice turbulence index. **WP:** Waterpipe. **WPS:** Waterpipe smoking.