Narghile: Perspectives, reality and effects on health

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Abstract

Smoking is the cause of different diseases worldwide, with different forms of consumption, such as the hookah, which has been increasingly used in Brazil, especially among young people. The hookah is a water-based pipe with a mixture of different flavors and aromas, and it can be shared by more than one person at the same time. It can cause the transmission of infectious diseases, in addition to the development of systemic diseases due to their toxic substances. The objective of this work was to carry out a review on the hookah use and its interference in the individual's health. For this, a bibliographic search was carried out in the online database of PubMed/Medline and Scholar Google, in addition to other relevant sources, such as the Brazilian Ministry of Health and the American Centers for Disease and Control and Prevention (CDC). A total of 13 articles, which met the established inclusion criteria, were used in this review. It can be seen that the tobacco present in the hookah contains toxic and carcinogenic substances, in addition to the possibility of transmission of infectious diseases during its use, thus showing that this product is harmful to the health of the individual.

Keywords: Smoking Water Pipes; Water Pipe Smoking; Tobacco, Waterpipe.

1. Introduction

Smoking is the leading cause of preventable death in the world, accounting for 85% of deaths from chronic lung diseases (emphysema and bronchitis), 30% from different types of cancer (mouth, pharynx, lung, stomach, larynx and others), 25% for coronary diseases (angina and infarction) and 25% for cerebrovascular diseases (stroke AVC). Among the different forms of tobacco consumption, there is the narghile, a water-based pipe of oriental origin, which is being increasingly consumed in Brazil (Brasil, 2019a). Despite the decrease in smoking, there are still 210 thousand users of various types of tobacco in Brazil, including the hookah (Brasil, 2018).

The hookah, also called narghile, waterpipe or shisha, is an apparatus used to smoke tobacco associated with a combination of different flavors and aromas. It is quite popular and attractive, being a favorite for youngers among tobacco products. It works through a system in which the mixture of tobacco and other substances is heated, producing smoke, which passes through a 'filter' of water, being sucked by users through a mouthpiece, through a long hose (Cdc, 2021, Brasil, 2019a; Alharthi et al, 2017; Brasil, 2013).

Due to the presence of a kind of water filter in the device, the hookah can, erroneously, be considered as less harmful to health, compared to other types of tobacco. Water, in fact, has the role of cooling the heat of the smoke generated, thus contributing to a deeper inhalation, which makes the vapor loaded with

toxic products penetrate more intensely into the lungs (Brasil, 2019b). For this reason, hookah is considered more harmful than conventional cigarettes. The duration of a session lasts from 20 to 80 minutes, which corresponds to the same amount of smoke generated by 100 cigarettes, thus revealing the distorted view that the hookah is less harmful to the health of its users (Brasil, 2018).

Sharing of a single hookah by several individuals at the same time supports socialization among youngers (Brasil, 2019a). Thus, by sharing the same hookah mouthpiece with other people, users may also be exposed to diseases such as herpes, tuberculosis, hepatitis C, mouth cancer, respiratory diseases and periodontal disease (Cdc, 2021; Brasil, 2019a; Brasil 2013).

Therefore, it is necessary to discuss the insertion of the hookah in people's lives, especially youngers and the consequences that it can have on the general and oral health of its users. The objective of this work was to carry out a review on the use of the hookah and its interference in the individual's health.

2. Material and Methods

This work was prepared through a bibliographic search carried out in August 2021, through the online database of the National Center for Biotechnology Information- NCBI (PubMed) (https://www.ncbi.nlm.nih.gov/pubmed/), using the terms “narghile”, “dentistry” AND “oral condition”, as the search. In addition, another search was carried out on Scholar Google, using the terms “hookpipe and health”. In both databases, articles in English, published in the last 10 years, were included, excluding in vitro and animal studies and literature reviews (non-systematic). After reading the abstracts, the selected articles were read to verify their suitability to the topic. Additionally, a manual search was performed in reference lists of pre-selected articles. Relevant websites (national and international), such as the Brazilian Ministry of Health and the National Cancer Institute (INCA) and the American Centers for Disease and Control and Prevention (CDC) were also accessed.

3. Results

This work was prepared through a bibliographic search carried out in August 2021, through the online A total of 13 articles were used in this review, which met the established inclusion criteria, and two sites were also consulted for search.

3.1Hookah Components

The hookah is a device made up of different components: bowl (or head), ashtray (or plate), body, base and one or more hoses, with the mouthpiece (or cigarette holder). To use it, the combination of tobacco and other substances is placed in the bowl and is kept warm by a sheet of aluminum paper placed on top of the substances, in order to keep the tobacco warm. The cavities present at the base of the bowl allow the smoke generated to travel through the body of the hookah, bubble in the water, and be sucked through the hose, during the drags through the mouthpiece (Brasil, 2019b).

3.2 Epidemiology of hookah users in the world and in Brazil

The hookah has been used for centuries in the Middle East, Africa and some parts of Asia. It is estimated that around 100 million individuals in the world use this product, and its use is increasing worldwide (Brasil, 2019b).

In an investigation that included 1454 Jordanian university students, it was found that 552 (38%) students used the hookah frequently, however, only 396 (27.2%) confirmed that they were current

hookah users. Among these students, 297 (20.4%) claimed to smoke weekly and 72 (5%) smoked daily. A large part (n=438, 30.1%) of the students revealed that they started smoking narghile with friends and 67 (4.6%) of those started with their family. Considering that students in this study started using the hookah at an early age, still in childhood and adolescence, it was observed that social behavior and the role of the family were reproduced early in life, initiating addiction and establishing later undesirable habits, remaining the addiction in adulthood (Dar-Odeh et al, 2010).

In a survey of 9119 young Americans (aged 18 to 24), it was found that 44% (n=4012) of these had already smoked the hookah. A total of 29% (n=2644) of youngers in this age group declared to be an exclusive hookah user, 28% (n=2553) indicated the use of different types of tobacco, and 16% (n=1459) were users of both narghile, and conventional cigarettes (Salloum et al, 2017).

In Brazil, Bertoni et al (2019) investigated the prevalence of users of electronic cigarettes and hookah, in addition to the sociodemographic differences between these and traditional cigarette users. Authors were based on the Brazilian Household Survey on Substance Use, with sample data from Brazilians aged 12 to 65 years, where the prevalence rates of tobacco products were estimated. Thus, it was found that in the year (12 months) prior to the survey, 23.5 million Brazilians used the traditional cigarette; 2.5 million used the hookah and 650,000 used the electronic cigarette. Non-heterosexual individuals were more susceptible to the use of these three products, with a higher prevalence of use in the Brazilian Southeast, South and Center-West regions, when compared to the Brazilian North and Northeast regions. However, factors such as age and income differed between these products, with e-cigarette and narghile users being younger and having better socioeconomic status when compared to conventional cigarette smokers. Therefore, it is important that there are campaigns, mainly aimed at youngers, to prevent the use of hookahs and electronic cigarettes, with the objective of containing a new nation of smokers in Brazil.

Menezes et al (2015) analyzed the frequency of hookah consumption among Brazilian adults through a cross-sectional study, consulting data from the National Health Survey 11 (PNS, 2013) and restricting the sample size to adults aged 18 to 59 years, who revealed the use of any tobacco-based product (n=7328). Among these, the frequency of use of the hookah was only 1.2% (n=88). Among those who confirmed the frequent use of the hookah, the use was arranged as follows: 53% (n=47) used it sporadically (less than once a month); 27.3% (n=24) used it weekly; 12.8% (n= 11), monthly use, and 6.8% (n= six), daily use. It is important to emphasize that the use of the hookah was more associated with young people with medium and high education, living in urban areas.

3.3Toxic Substances present in Hookah

The hookah smoking habit is cultural in many Middle Eastern countries, however, it has been gaining popularity in the West. This is the result, in part, of its aggregating role, as a way of greater interaction and connection between people. However, its use exposes users to high levels of toxic substances, such as carbon monoxide (CM), polycyclic aromatic hydrocarbons and aldehydes (Rashidi et al, 2008).

Hookah smoke contains both the toxic products released by coal and the toxic products from tobacco. Coal helps in the production of high levels of CM, which causes intoxication in users, given that carboxy-hemoglobin is formed, impairing the passage of sufficient oxygen to the body, including the brain. Thus, exposure to high concentrations of CM can cause syncope in users (Brasil, 2017a), which can lead to traffic accidents due to cerebral hypoxia, considering that it can cause complications with motor coordination, dizziness, anxiety vomiting and drowsiness (Brasil, 2019b).

Aldehyde compounds found in hookah smoke are also considered carcinogenic, toxic and dangerous (Rashidi et al, 2008), showing that the continued use of hookah can result in long-term illnesses (Brasil,

2017a). Formaldehyde is identified as a carcinogenic product, which can cause cancer in the nasopharynx region, leukemia and irritation of the upper airways (Rashidi et al, 2008).

3.4 Hookah and General Health

Smoking hookah has health consequences for users, and its practice is associated with negative effects on the respiratory system, such as chronic obstructive pulmonary disease-COPD (Salameh et al, 2012) and also negative effects on the cardiovascular system, causing disease coronary artery (Sibai et al, 2014) and in the oral cavity, being a risk factor for oral cancer (Al-Amad et al, 2014).

In a case-control study, with the participation of 833 individuals, the association of hookah use with chronic bronchitis was analyzed. These individuals were divided into two groups: (a) patients with chronic bronchitis (n=274), and (b) a control group, without bronchitis (n=559). The authors found that previous hookah smoking (OR=6.4), previous mixed smoking of cigarette and hookah (OR=38.03) and current mixed smoking (OR=7.68) were significantly associated with chronic bronchitis ($p<0.001$ for all). Also, a cumulative dose of 20 hookah-years was implicated in increasing the risk of bronchitis 14 (Salameh et al, 2012).

Hookah use is also associated with coronary artery disease. In a survey conducted with 1210 participants over 40 years of age, it was observed that the use of the hookah, throughout life, was related to the development of coronary artery disease. Compared to non-smokers, hookah users were nearly three times more likely (OR = 2.94) to develop severe coronary artery stenosis (narrowing). Thus, it is necessary to monitor (as well as observations made for conventional cigarettes) the use of hookah in cardiac patients (with notes in their medical records of the frequency of use) and their awareness of the risks of hookah to health (Sibai et al, 2014).

3.5 Hookah and Oral Health

In a case-control study, carried out in 2016, 72 male individuals with dental implants were divided into two groups (G): G1, consisting of men (mean age 45.3 years), who used the hookah exclusively for , at least once a day, in the last year (without having consumed any other form of tobacco), and G2, composed of men (mean age 42.6 years) who had never consumed any form of tobacco (non-smokers). It was found that bone loss, peri-implant biofilm index and pocket depth were significantly higher in G1, whereas bleeding on probing was significantly higher in G2. According to the authors, the presence of nicotine can hinder the ossification surrounding dental implants and impair osseointegration, in addition to intensifying the accumulation of dental biofilm and decreasing cell healing. Therefore, the authors concluded that hookah users were more susceptible to peri-implant diseases when compared to non-smokers. In addition, the family history of tobacco smoking was verified among the participants, with 26 (74%) exclusive hookah users (G1) reporting a history of smoking (any type of tobacco) in the family, with only 14 (37%) non-smokers (G2) with this family history. Thus, individuals with tobacco-using family members are more likely to smoke tobacco-based products, including the hookah (Abduljabbar et al, 2017).

The investigation by Alahmari et al (2019) aimed to analyze peri-implant soft tissue inflammation and bone loss in implants placed in cigarette smokers, hookah users and non-smokers, with an eight-year follow-up. For this, 123 participating individuals were categorized into: non-smokers (n=42), cigarette smokers (n=41) and hookah users (n=40). It was found that the peri-implant biofilm index, probing depth and bone loss were statistically higher in conventional cigarette smokers and hookah users compared to non-smokers, and that bleeding on probing was statistically higher in individuals non smokers. Thus, the authors found that hookah users and cigarette smokers were statistically more prone to bone loss and peri-implant inflammation when compared to non-smokers.

In a research carried out by Alqahtani et al (2019), the association between self-perception of oral symptoms and clinical and radiographic parameters of cigarette smokers, hookah users, and non-smokers was investigated. One hundred male individuals with dental implants participated, who answered a questionnaire regarding oral symptoms (halitosis, pain and gingival bleeding), in addition to undergoing clinical and radiographic evaluations (plaque index, probing depth, bone loss). It was observed that gingival pain and halitosis were the symptoms most noticed by cigarette smokers and hookah users, compared to non-smokers. In addition, it was found that probing depth, plaque index and bone loss were significantly higher in smokers and hookah users (with no statistical differences between them), compared to non-smokers. It was concluded that tobacco smokers with dental implants had a worse perception of their oral symptoms and worse clinical and radiographic results compared to non-smokers.

In a study developed by Al-Amad et al. (2014), the association between risk factors, such as smoking and alcoholism, in Jordanian patients with oral cancer (squamous cell carcinoma) was evaluated, as well as the age of patients at diagnosis. Patients diagnosed with oral cancer (n = 102) were interviewed regarding the use of: hookah, cigarette and alcohol. It was found that 67 (66%) participants were cigarette smokers; 37 (36%) were hookah users, and 17 (17%) consumed alcohol at least once a month. Regarding associations, 22 (22%) smoked cigarettes and hookah; 11 (11%) associated hookah and alcohol and two (2%) used the three concomitantly. Regarding the age of patients at the time of diagnosis of cancer, it was observed that the fact that they smoked hookah regularly (n=27) was associated with a reduction in the mean age (45.2 years) of cancer patients, compared to those who did not. smokers (62.5 years). Thus, it is understood that the practice of smoking hookah becomes an (independent) risk factor related to the emergence of oral cancer in younger individuals.

Alharthi et al. (2017) investigated the clinical and radiographic parameters of peri-implant inflammation in 128 male subjects. These individuals were divided into three distinct groups: (a) 44 cigarette smokers, (b) 41 hookah users, and (c) 43 non-smokers. A questionnaire was applied regarding the frequency of use of cigarettes and hookah, the length of sessions and family history of smoking. In addition, 179 implants were placed in these individuals, and the peri-implant biofilm, probing bleeding, probing depth, and bone loss indices were assessed. It was observed that plaque index, probing depth and bone loss were significantly higher in cigarette smokers and hookah users, whereas bleeding on probing was significantly greater in the non-smoking group. Interestingly, although the daily frequency of smoking was slightly higher in cigarette smokers (112 minutes), compared to hookah users (108 minutes), there were no statistically significant differences between these groups, in contrast to the idea that smoking hookah is not harmful to health. In addition, the family history of smoking was more evident in smokers (groups a and b), which may indicate that non-smokers who had smoking family members will be more likely to start using tobacco at some point, when compared to individuals who did not have this family history.

3. Discussion

The habit of smoking hookah, a cultural custom in Eastern countries such as Turkey and Lebanon (Brasil, 2017b; Salameh et al., 2012) and Jordan (Dar-Odeh et al, 2010), in addition to being more socially accepted than cigarettes, is becoming popular in the West, mainly in the United States (Salloum et al, 2017). Its popularity is closely associated with younger individuals (Brasil, 2019[a]; Abduljabbar et al, 2017; Rashidi et al, 2008), who come together as a form of socialization and share among themselves the nozzle of the hookah hoses. Thus, in addition to other oral and systemic damage caused to health, hookah users can contract infectious and contagious diseases such as herpes, tuberculosis, hepatitis C, and even Covid-19, when sharing the same nozzle (Cdc, 2021; Brasil, 2019a; Brasil, 2013).

The hookah has a false feeling of innocuity, believed mainly by youngers, because the 'filtering' of tobacco is water-based (Alahmari et al, 2019; Alqahtani et al, 2019; Brasil, 2018) and the presence of essences (Brasil, 2017b) which confers pleasant aromas and flavors when inhaled. In fact, the water cools the temperature of tobacco heating, forming the aerosol to be aspirated, with no real filtering power (Brasil, 2019b). Importantly, Silva et al (2021) found, through a review, that the filters of conventional cigarettes, in addition to not bringing any health benefits, also cause an environmental impact and should be prohibited, according to the articles reviewed.

Furthermore, as it presents toxic substances in the constituents of tobacco and also in coal, such as nicotine, carbon monoxide, polycyclic aromatic hydrocarbons and aldehydes, it harms the health of individuals (Brasil 2019b; Brasil, 2017a; Dar-Odeh et al, 2010; Rashidi et al, 2008). Carbon monoxide is associated with cardiovascular diseases, polycyclic aromatic hydrocarbons are related to cancer (Menezes et al, 2015) and aldehydes are also carcinogenic and toxic (Dar-Odeh et al, 2010; Rashidi et al, 2008).

Tobacco is cause of several lung diseases, different types of cancers, heart and cerebrovascular diseases, and since the hookah is one of the ways of using this product (Brasil, 2019a), it also causes damage to its users' health. Cancer of the nasopharyngeal region, leukemia, irritation of the upper respiratory tract (Rashidi et al, 2008), chronic obstructive pulmonary disease-COPD (Salameh et al, 2012); coronary artery disease (Sibai et al, 2014), and mouth cancer (Al-Amad et al, 2014) are some of the complications that can be triggered in hookah users and also any type of tobacco.

Regarding oral health, the use of hookah can lead to conditions such as alveolitis, inflammation, lesions with potential for malignancy and oral carcinoma (Abduljabbar et al, 2017). In addition, alveolar bone loss, periodontitis and peri-implantitis are also conditions that can be triggered by the use of tobacco that constitutes the hookah (Alahmari et al, 2019; Abduljabbar et al, 2017), as well as cell carcinoma scaly (Al-Amad et al, 2014).

The peri-implant problems of hookah users, resulting from the inhalation of smoke products, can be caused by the induction of the oxidative state of stress in tissues, causing cell death (Alahmari et al, 2019; Alqahtani et al, 2019), with nicotine being responsible for the increase in inflammation in periodontal tissues (Alahmari et al, 2019; Alqahtani et al, 2019; Abduljabbar et al, 2017) and also for the reduction of gingival blood flow, as it has a vasoconstrictor effect (Alqahtani et al, 2019; Abduljabbar et al, 2017). The nicotine present in tobacco is addictive and addictive, even with the presence of hookah flavorings, giving the false impression of the product's innocuousness. Also, to reinforce the feeling of innocuity, as well as the cigar and the pipe, it is claimed by hookah users that the smoke is not inhaled, and it is only used to taste the product (Brasil, 2017b).

Another point to be highlighted is the individuals' family history of smoking, as it promotes greater inclination for them to start smoking (Abduljabbar et al, 2017; Alharthi et al, 2017; Dar-Odeh et al, 2010). This shows that social practices and customs greatly influence young people's behavior, determining habits that can be maintained throughout life and result in future health problems.

5. Final Considerations

Although hookah smoke is not inhaled, according to its users, it is indisputable that the charcoal present in this device and also tobacco, which contains toxic and carcinogenic substances, such as nicotine, which is addictive and promotes dependence. Lung diseases (chronic bronchitis), cardiovascular diseases, mouth cancer and periodontal and peri-implant diseases are associated with the use of the hookah.

Socialization among youngers promoted by the meeting to smoke the hookah is a moment of leisure and communication, however, sharing the same mouthpiece by users can also transmit infectious diseases,

such as hepatitis C, herpes, tuberculosis and even Covid-19. In addition to all these factors related to its use, it is known that the time of a hookah session is, on average, approximately one hour (20 to 80 minutes), which corresponds to an amount of smoke generated per 100 conventional cigarettes, thus revealing harm to the individual's health.

Smoking, in all its forms, is still a global disease and a practice that has been reflected and spread across generations. Thus, more effective and efficient public measures and campaigns are needed, broadcast in different media, in order to reach the population, especially the younger ones. Such campaigns should highlight the harm caused by tobacco-based products (narghile, conventional cigarettes and electronic devices for nicotine release) they can cause to health, so that this habit is gradually reduced in society.

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