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Review Article

Waterpipe Smoking and the COVID-19 Syndemic - @

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ABSTRACT

This paper aims to provide a background to the phenomenon of waterpipe smoking during the present COVID-19 syndemic. In the context of a syndemic, it seeks to summarise what research findings have revealed to date of the specific dangers of this form of tobacco use in the current situation, in terms of the particular dangers of the use of the apparatus itself, social settings in which waterpipes are smoked, and the perceptions of smokers themselves on the potential harms at this time.

A narrative review, based on a focused search of electronic databases, sought to answer the following research question: does waterpipe smoking increase the risk of transmitting COVID-19 infection? The conclusion reached from the articles reviewed was that (a) they provided strong confirmatory evidence of the specific dangers of transmitting viral infection via the waterpipe apparatus itself and (b) the crowded social milieu of waterpipe cafes facilitated the transmission of the virus. The discussion of the results of the research was then widened to include what is known about the beliefs of smokers in general, and waterpipe smokers in particular, on the health risks of waterpipe smoking and the likely transmission and severity of the COVID-19 virus.

Keywords: Syndemic; Waterpipe; Review

INTRODUCTION

A number of published studies have investigated diverse aspects of the impact of COVID-19 on various aspects of the behaviour of individuals during lockdowns. These include a survey conducted in Italy into eating habits and lifestyle changes [1], sedentary time and behaviour [2] cannabis use in Spain [3] and smoking. Those studies which refer to waterpipe (hookah) smoking behaviour during the COVID-19 syndemic, rather than smoking behaviour in general, were clearly most relevant in attempting to answer the research question.

First, however, the choice of the term syndemic rather than pandemic should be explained [4-6]. What drives the coronavirus to spread through the population of a specific region or country is an interaction of particular political, social, economic and cultural factors. Patterns of social inequality exacerbate the effects of disease and illness, and therefore health provision cannot afford to consider public health solely from a perspective of a biomedical issue. Synergistic failures cannot be omitted from the discussion of forms of tobacco use or a wide range of causes of ill-health, including viral diseases, and how to combat them in the future. For example, an online national survey [7] of over 4000 adolescents and young adults (aged 13-24) was conducted in the USA in May 2020, investigating a possible association between cigarette and e-cigarette use and COVID-19. One finding was that some ethnic groups, especially among African American, Hispanic and other multi-race youth, were at an increased risk of contracting COVID-19. In their communities, crowded living conditions made social distancing difficult, they experienced greater economic stress, having to work in service-industries rather than self-isolate working from home, and problems of accessing health care were all contributory factors. In terms of waterpipe smoking, a study conducted in 2010 in Iran, but only published in 2021, related this practice to educational level, gender and socio-economic status [8]. While there was no significant difference in men of high and low socio-economic status for daily waterpipe smoking, there was a higher prevalence of waterpipe smoking among women of low socio-economic status. The authors attributed this to educational level. Other studies have considered smoking from a syndemic perspective, incorporating factors such as gender, income level and other socio-economic indicators [9-11]. Hence, in a syndemic approach, biomedical aspects cannot be studied in isolation, particularly in the case of communicable diseases.

METHODOLOGY

This study aimed to provide a background of the potential dangers of waterpipe smoking during the COVID-19 syndemic. In

order to achieve this objective, a narrative review [12] of the literature relating to this topic was conducted from October to December 2021. This review aimed to synthesize existing findings not only on the dangers of waterpipe smoking during the syndemic, but also on the behaviour of waterpipe smokers, and official actions to control or influence such behaviour. A comprehensive list of articles relating to the practice of waterpipe smoking published since the beginning of the syndemic was compiled up to February 2022. In addition, literature relating to the prevalence of waterpipe smoking prior to the start of the syndemic was also consulted, to provide a necessary background for the evaluation of recent changes.

A search was made of electronic databases, to include both primary studies and systematic reviews. PubMed, ISI Web of Science, CrossRef and the World Health Organisation (WHO) websites were searched from 1990 to December 2021. KA and PW conducted this search and a cross-referenced short list of 76 articles was compiled, based on the following search terms: waterpipe smoking, hookah, COVID-19, health effects. Not all studies were excluded which related to cigarette smoking and COVID-19 – in particular, the abstracts of articles which examined smoking and health behaviour during the syndemic were reviewed and, where relevant to the objective of this paper, were included in the final shortlist. Out of 76 screened articles, a final list of 49 was selected for inclusion in this review. In terms of the data extraction, author, year/month of publication, type of study and design, sample size, duration of the study, the setting and principal outcomes were all recorded.

RESULTS

It has been argued [13] that waterpipe smoking is associated with an increased risk of transmitting the COVID-19 virus. As circumstantial evidence for this, those authors cite a study [14] which investigated the link between Middle East Respiratory Syndrome coronavirus (MERS) and waterpipe smoking. This was a surveillance study, testing samples from almost 2,500 waterpipe hoses throughout several regions in Saudi Arabia. Repeated sampling was carried out between winter 2015 and spring 2016 at cafes near sites of MERS-CoV emergence. The screening results for the presence of MERS-CoV were negative. The authors concede that these results may be the result of inadequate sampling. There is thus no firm evidence to date of a direct association between waterpipe smoking and the transmission of COVID-19. However, despite the need for more research, the WHO is urging that strict measures be imposed in member countries to ban the use of waterpipes [15] as one of the necessary measures to control the transmission of the virus.

There are a number of reasons why the WHO is concerned about changing the behaviour of waterpipe smoking specifically in the context of the present syndemic. Of the direct association which is posited between this practice and viral transmission, both in the case of the MERS-CoV study [13] and more generally by the WHO [15,16], the following reasons are given. Firstly, the smoking of waterpipes in cafes presupposes communal use – the sharing of a single mouthpiece and hose, and the impossibility of physical distancing in this social environment. Secondly, in waterpipe cafes, one study [14] noted the lack of routine cleaning of the waterpipes after each smoking session, further increasing the risk of transmission of infectious microbial agents. In addition, these cafes throughout the world tend to be densely occupied and badly ventilated [17]. Another study [18] noted that sharing a waterpipe contributes to a range of tuberculosis, viral and bacterial infections when an infected user shares a mouthpiece with non-infected individuals through the transmission of oral secretions.

Findings from various studies, of course, precede the COVID-19 syndemic. Corroborative evidence is provided, in the context of COVID-19, in a Far Eastern study [19]. This was a convenience sampling study conducted in the Lao People's Democratic Republic in July 2011 where, although the waterpipe has a simple bamboo construction, the parts still perform the same function as the Eastern Mediterranean waterpipe. In this study, samples were taken from the water bowl of the waterpipe, and the field assessment of water quality indicators showed that the water inside the Lao waterpipes had the potential to be contaminated by various types of micro-organisms. In addition to microbial mechanisms, infectious disease exposure – such as to the transmission of viruses – was identified as a potential risk. The COVID-19 virus thrives in dark, humid environments and will be spread through communal use in the smoking process.

In Turkey, one study [20] analysed culture samples from 182 waterpipes used in public places. The inside and outside of the mouthpiece were sampled, along with water from the waterpipe bowl. The mouthpiece – inside and outside – and the handle were found to be the most affected parts in terms of bacterial contamination. The role played by hand contact is evident in the results found from analysis both of the handle and the outside of the mouthpiece. The authors found that microbial growth in the waterpipe samples collected from the public establishments was very high. This indicates that waterpipe

smoking increases the likelihood of the transmission of respiratory pathogens – viruses, as well as tuberculosis [19], fungi and a range of bacteria. The study did not analyse samples from the interior of the hoses, although the authors cite other earlier research which tends to confirm their findings [21-23].

Although the majority of these studies, therefore, pre-date the outbreak of the COVID-19 syndemic, they clearly underpin the concerns expressed by the WHO about the potential risks of waterpipe smoking for increased transmission of the virus. A summary is provided in table 1 below.

DISCUSSION

Evidence for the many harms resulting from cigarette smoking has been furnished by innumerable studies, to the effect that the best efforts of the tobacco industry have been unable to contest the findings, which are now universally acknowledged. In terms of cigarette smoking and health risk beliefs during the COVID-19 syndemic, a recent paper [24] has provided a useful review of the findings to date. As the author indicates, some studies have concluded that current or former cigarette smokers are at higher risk of contracting more severe symptoms of COVID-19, or even mortality, than never-smokers. The proponents of the opposing case argue that nicotine may have a protective role in those who contract COVID-19 [25-27]. Several articles have considered the evidence for both claims [28-30].

The survey results obtained, in the UK at least, [24] indicate that the perceived probability of contracting COVID-19 correlated with motivation to quit cigarette smoking. Having reviewed the findings of studies on the dangers of cigarette smoking in relation to COVID-19, it remains to discuss the perceptions of waterpipe smokers on the risks posed by the syndemic.

As in the case of cigarette smoking, the evidence for the harms occasioned by waterpipe smoking is overwhelming. These harms include significant association with lung cancer, respiratory illness, bladder and oral cancers, and heart disease among its many serious risks [31-33]. A full appraisal of these harms may be found in a recent overview [34]. The waterpipe smoke – a mixture of tobacco and molasses known as '*maasel*' – is cooled as it passes through the base of the waterpipe, enabling smokers to inhale it deeper into their lungs.

Table 1: Waterpipe use and risks of infections: A literature summary.

Authors	Date conducted	Sample size	Place conducted	Type of study	Aim of study
Alagali, et al. 2019 [14]	2015-2016	2500 hoses	Saudi Arabia – cafes in various regions	surveillance	Test for presence of MERS-CoV
Alaidarous, et al. 2017 [22]	unspecified	264 culture samples	Saudi Arabia – 3 cities (10 cafes)	Random sampling	Identify bacteria contaminating waterpipe bowls, mouthpieces
Altindis, et al. 2020 [20]	2020	728 culture samples (182 waterpipes)	Sakarya province, Turkey (7 public lounges)	surveillance	Identify bacteria colonising waterpipes
Daniels & Roman 2013 [18]	unspecified	389 students	Western Cape, South Africa	Cross-sectional, descriptive	Assess behaviours, beliefs re. health risks of waterpipe smoking
Safizadeh, et al. 2014 [21]	unspecified	285 culture samples	Kerman, Iran (15 cafes)	Random sampling	Bacterial contamination of waterpipes
Shakhatreh, et al. 2018 [23]	unspecified	100 participants	Irbid, Jordan (cafes)	Random sampling	Bacterial contamination of waterpipes
Sinclair, et al. 2021 [19]	July 2011	43 participants in 5 rural villages	Lao People's Democratic Republic	Survey type unspecified	Test for microbial survival and growth in waterpipes

However, despite such evidence, waterpipe smoking is widely considered to be less harmful than cigarette smoking [35]. There is a misconception that passing smoke through the water acts as a cleaning process to remove toxins [32] along with the view that the intermittent practice of waterpipe smoking is less harmful compared with the constant use of cigarettes [36,37]. A single waterpipe smoking session typically lasts for 30-90 minutes, during which time a large volume of smoke is produced. This contains the equivalent of 80 times more toxicants than those found in the smoke of a single cigarette [38]. The effect on smokers, and second-hand smokers, in cafes, homes or meeting places has serious health implications. The tobacco industry has played a role in promoting this confusion [37,39]. In fact, waterpipe users are exposed to many of the same toxic compounds as cigarette users, although at levels which are much higher [36,40].

While there are estimates of 100 million waterpipe smokers globally [38,41], these are less useful than national and regional studies in identifying trends. The WHO Tobacco Atlas [42] adopts such a national approach to the prevalence of waterpipe use, for example to identify trends in Syria, 1955-2000. Another study adopted the same approach for the Middle East and Europe. The principal trends have also been summarised [37]. Although prevalence is highest in the Middle East and North Africa, waterpipe use is growing rapidly in Europe and the Americas [31,43]. The practice declined during most of the 20th century, but waterpipe smoking saw a rapid increase in popularity in the 1990s coinciding with the introduction of sweetened waterpipe tobacco (*maassel*). The tobacco industry commercialised and glamourised the practice on the internet and mass media, especially targeting the youth market. Studies of waterpipe smoking indicate increases since that time in most countries both for daily use and ever-use, with the greatest increases among the youth, both boys and girls [44]. A growing number of national studies confirm this trend while further confirmatory evidence is provided from the Global Youth Tobacco Surveys [45].

In a recent systematic review, the authors [43] draw attention to the management and prevention of waterpipe tobacco use, noting that waterpipe products are still tax exempt; although taxation has been effective in controlling cigarette smoking, this may not be the case with waterpipe use [34,44]. In the present situation of the presence of COVID-19, the association of waterpipe smoking with the restaurant and cafe culture – an influential factor in its growth and popularity – has induced some authorities to institute bans on these places. The Eastern Mediterranean Regional Office (EMRO) of the WHO has reminded its 19 member states that, as signatories to the Framework Convention on Tobacco Control, they have a legal obligation to ban smoking in all indoor public places. According to the WHO, 17 of the member countries have banned waterpipe use temporarily in public places [16], though full implementation of the legislation is necessary to put this into effect. The WHO EMRO has publicised the measures taken in Iran to ban waterpipe use in public places to limit the spread of COVID-19 [46] as an instance of what can be achieved through determined policy implementation.

The Eastern Mediterranean Region still has the highest prevalence of waterpipe smoking in the world [47]. Two recent studies from this region investigated the relationship between beliefs and tobacco use behaviours and the risk of COVID-19 infection among samples of smokers and never-smokers. Both studies included

waterpipe smoking in their surveys. Firstly, in Iran, one study [48] included 89 waterpipe smokers among respondents in their online national survey. From the responses, 38.2% of waterpipe smokers considered that waterpipe smoking was related with spreading infection of COVID-19, compared with 14.6% of cigarette smokers who believed that cigarette smoking was related with spreading infection of COVID-19. Of all the 944 study participants as a whole, 29.1% thought that cigarette smoking was related with spreading COVID-19 infection, compared with 49.4% who believed that waterpipe smoking and spreading COVID-19 were related. The survey also found that waterpipe smokers (approximately 1 in 4) were more likely than cigarette smokers and never-smokers to believe that smoking waterpipe at home was safe during the syndemic, and that smoking waterpipe would have a protective effect and lead to more rapid recovery if they were to be infected with COVID-19. This is all the more concerning, since in Iran waterpipe-home delivery services have become popular with the closure of cafes due to government bans [48]. Such perceptions of the safety of waterpipe smoking will increase risk for the smokers themselves and those – such as the family in the home – with whom they interact.

A second study into health beliefs and tobacco use during the syndemic also included waterpipe smokers among the participants. In Jordan, an online survey conducted in March 2021 [49] included 2424 participants. Among the findings related to waterpipe smoking, respondents recorded their opinions on the relationship between smoking and domains of COVID-19 such as risk and spread of infection, safety concerns of smoking in public places and the home, clinical outcome and the belief in the protective effective of nicotine. Approximately 38.2%, 72.9% and 44.6% of respondents believed that cigarette smoking, waterpipe smoking and e-cigarette smoking respectively were related to the risk of contracting COVID-19. Clearly, participants considered that waterpipe smoking constituted a much higher risk. About 74% also considered that severity of COVID-19 would be worse for waterpipe smokers, and almost 80% believed that waterpipe smoking in public places was unsafe during the syndemic.

CONCLUSION

All the evidence suggests that waterpipe smoking poses its own unique set of risks and hazards during the COVID-19 syndemic. When combined with the well-established dangers of tobacco use in causing mortality and morbidity, contributing to a wide range of illnesses, the particular features of waterpipe smoking – the social setting, the apparatus used, the perceptions of waterpipe smokers themselves – all present a cause for concern.

This review has concentrated on the research conducted in the Middle East region, both before and during the COVID-19 syndemic. While this region constitutes the highest use of waterpipe smoking, it is necessary to emphasise again that a growing body of research has alerted health authorities on the growing widespread use of waterpipes as a global problem, along with e-cigarettes and even e-hookah innovative products promoted by the tobacco industry. Misinformation disseminated by the industry has aided in influencing perceptions and endangering lives.

More information is now required on motivation specifically to quit waterpipe smoking since the start of the syndemic, along with an appraisal of the effect of bans on waterpipe cafes in those countries where such bans have been applied.

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