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Impact of Shisha Smoking on The Extent of Coronary Artery Disease in Patients Referred for Coronary Angiography

Thesis

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Introduction

According to epidemiological data during the next 10-20 years cardiovascular diseases will be the leading cause of death all around the world. Smoking is the most important risk factor causing half of all avoidable death, half of these deaths caused by cardiovascular diseases ***(Janosi, 2005)***.

Coronary heart disease (CHD) is caused by a narrowing of the coronary arteries, leading to an imbalance between the functional requirements of the heart and the capacity of the coronary arteries to supply blood and oxygen.

Clinical manifestations of CHD include stable or unstable angina pectoris, myocardial infarction, cardiac arrhythmias, congestive heart failure, and/or sudden cardiac death. ***(Nordhorn and Willich, 2008)***.

Smoking is the most important acquired and preventable cause for development of coronary heart disease (CHD) amongst men and women ***(Os et al., 2003)***.

New ways of consuming tobacco or nicotine have recently been developed attracting smokers not only because of their novelty but also because they hope that it will decrease their health risks or will help them smoking in banned places ***(Jacot and Cornuz, 2009).***

Healthcare providers should be aware of new tobacco trends that may affect patients, such as waterpipe smoking, that are potential gateways to nicotine addiction. ***(Noonan and Kulbok, 2009).***

Although research reporting the health effects of water-pipe smoking is limited, multiple health risks have been associated with this type of tobacco use. Waterpipe smoking has been associated with cardiovascular health risks, including arteriosclerosis and coronary artery disease (CAD) ***(Noonan and Kulbok, 2009)***.

A common misconception about waterpipe smoking is that it is a safer alternative to other tobacco products because of the water filter and the intermittent use pattern associated with this form of tobacco ***(Asafar et al., 2005)***. This is far from the truth: a typical 1-hour session of waterpipe smoking exposes the user to approximately 100–200 times the volume inhaled from one cigarette ***(WHO, 2005).***

Although the association between cigarette smoking (CS) and cardiovascular risk has clearly been demonstrated, an unanswered question is whether or not there is a linear dose effect. [Several large epidemiologic studies showing a trend for more cardiovascular events in heavier active smokers have failed to find a significant dose-dependent correlation between cardiovascular risk and the number of cigarettes smoked or the pack-years of exposure ***(Ambrose and Barua, 2004).***]

Conventional angiography is the gold standard in clinical practice for diagnosing atherosclerotic compromise of the coronary artery tree ***(Fernandes et al., 2007).***

Coronary angiography is considered the gold standard method of imaging coronary stenosis. Quantitative coronary angiography (QCA) has helped to provide information about the degree of stenosis which is used as a surrogate to indicate impaired flow in a coronary bed ***(Swallow et al., 2006).***

Aim of The Work

The aim of the work is to study the impact of shisha smoking on the extent of coronary artery disease in patients referred for coronay angiography and compare it to regular cigarette smokers.

Chapter 1

Shisha Smoking

Introduction:

Tobacco use is a major public health concern and has been identified as the single most important cause of preventable mortality and morbidity worldwide. ***(Kulwicki and Hill Rice , 2003).***

Globally, 4.9 million deaths each year are attributed to tobacco use.This annual toll is expected to increase to 10 million within the next 20–30 years, with 70% of these deaths likely to occur in developing countries, making tobacco use a global epidemic. ***(Maziak et al., 2004a).***

Tobacco is manufactured and produced in several different forms to make it suitable for smoking such as; cigarettes, cigars, pipe, or waterpipe (shisha). While the awareness of health hazards related to smoking is certainly well known to the public, one still sees smoking affecting large number of different age groups in both sexes. Several studies have shown the risk of smoking in the development of CAD, moreover, the disease risks associated with cigarette smoking are proportional to the intensity and duration of smoking***(Al-Nozha et al., 2009).***

Types of smoking:

Smoked forms of tobacco include various kinds of cigarettes (manufactured, hand-rolled, filtered, unfiltered, flavoured), cigars and pipes. Although manufactured cigarettes are the most common type of smoked tobacco, other smoked tobacco products, such as *bidis*, *kreteks* and *shisha*, are gaining

popularity, often in the mistaken belief that they are less hazardous to health (***Figure 1***). (***WHO, Report on the Global Tobacco Epidemic. 2008***).

A. Smoked Tobacco :

- **Manufactured Cigarettes:** contain shredded and/or reconstituted tobacco combined with hundreds of chemical additives. The contents are wrapped in paper and may have a filter tip. ***(Delahanty et al., 2010).***

- **Roll-Your-Own Cigarettes:** are hand-filled cigarettes made from loose tobacco and rolling papers (i.e. cigarette paper). RYO cigarettes can be hand-rolled by the user or made with a hand-held rolling machine. ***(Mackay et al., 2006).***

- **Cigars:** consist of tightly rolled dried and fermented tobaccos wrapped in tobacco leaf. The user draws the smoke into his or her mouth but typically does not inhale it. However, cigar smokers who also smoke cigarettes or are ex-smokers of cigarettes are significantly more likely to inhale the smoke than are users of cigars only***.(Delahanty et al., 2010).***

Cigars come in a variety of shapes and sizes (e.g. cigarillos, double coronas, cheroots, stumpen, chuttas, and dhumtis), and they can also be "reverse smoked," which means that the ignited end of the cigar (chutta and dhumti) is placed inside the mouth. ***(Mackay et al., 2006).***

- **The Water Pipe:** also known as Hookah, shisha, gouza, narghile or hubble-bubble. Water Pipe smoking is characterized by passing tobacco smoke through water prior to inhalation. The waterpipe usually consists of a head, body, water bowl,

and a hose, attached one to the other. Tobacco is placed on the head and covered with a thin perforated aluminum plate. Lit charcoal is placed on the plate to burn the tobacco. The bowl is half filled with water and tobacco smoke is immersed into the water through a tube. Inhalation of the air from the mouth tube draws from the air-filled space in the water bowl so that smoke passes from the head to the body through the water to the mouth ***(Sarrafzadegan et al., 2010).***

- **Bidis** are small, thin hand-rolled cigarettes imported to the United States primarily from India and other Southeast Asian countries. They consist of tobacco wrapped in a tendu or temburni leaf (plants native to Asia), and may be secured with a colorful string at one or both ends. Bidis can be flavored (e.g., chocolate, cherry, and mango) or unflavored. ***(Yen et al., 2000).***

- **Kreteks:** are clove-flavoured cigarettes widely smoked in Indonesia. ***(Mackay et al., 2006).*** They contain a mixture of shredded clove buds and tobacco, which produces a distinct, pungent smell. Kreteks often contain eugenol, which has an anaesthetic effect and thus allows for deeper inhalation. Clove cigarette smoke contains more nicotine, tar, and carbon monoxide than smoke from conventional cigarettes. ***(Malson et al., 2003).***

B. Smokeless Tobacco

Smokeless tobacco comes in two main forms: chewing tobacco and snuff (moist or dry).***(Delahanty et al., 2010).***

Figure (1): Types of smoking.

<table>
<tr>
<td> 
Cigarettes are available throughout the world. Filter-tipped cigarettes are usually more popular than unfiltered cigarettes. Hand rolled cigarettes are also widely smoked in many countries.</td>
<td> 
The water pipe, also known as shisha or hubbly bubbly.</td>
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<td> 
Cigars</td>
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Bidis are found thoughout south-east Asia, and are India’s most used type of tobacco.</td>
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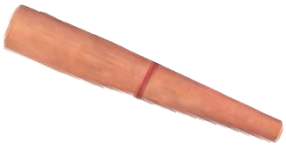
<td> 
Kreteks are clove flavoured Cigarettes widely smoked in Indonesia.</td>
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pipe</td>
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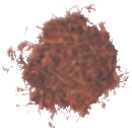
<td colspan="2"> 
Chewing tobacco is also known as plug, loose-leaf, and twist.</td>
</tr>
</table>

(Adapted from Mackay et al., 2006)

Prevalence of Tobacco smoking:

Worldwide, the number of smokers continues to increase and is estimated to reach 1.7 billion by 2025 ***(Mathers and Loncar, 2006).***

- **Prevalence in Egypt:**

- Nearly 20% (9.8 million) of the Egyptian population uses some form of tobacco product. Of this percentage, about 16.3% (8.1 million) smoke cigarettes, 3.3% (1.6 million) smoke shisha and 2.6% (1.1 million) use smokeless (chewed) tobacco (Figure2).
- According to age group, the percentage of the population that reported using any tobacco product increased to around 23% and nearly 26% among the age groups 25–44 years and 45–64 years, respectively (Figure 3).
- The prevalence of reported use of any tobacco product among all university graduates was about 16%. The percentage of reported use of any tobacco product among those with no formal education or those with some primary level education was higher, at around 21% and nearly 26%, respectively(Figure 4).***(WHO, Egypt Global Adult Tobacco Survey 2009)***

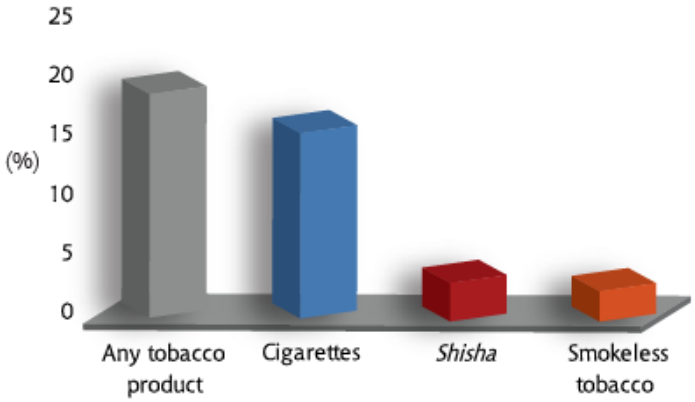


Figure 2. Percentage of tobacco use among the Egyptian population

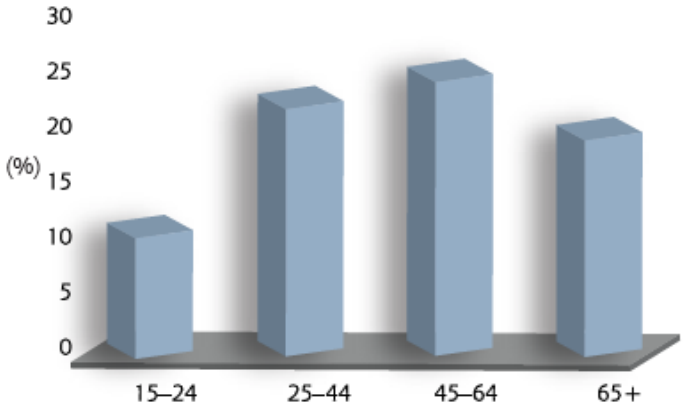


Figure 3. Percentage of the Egyptian population using any tobacco product according to age group

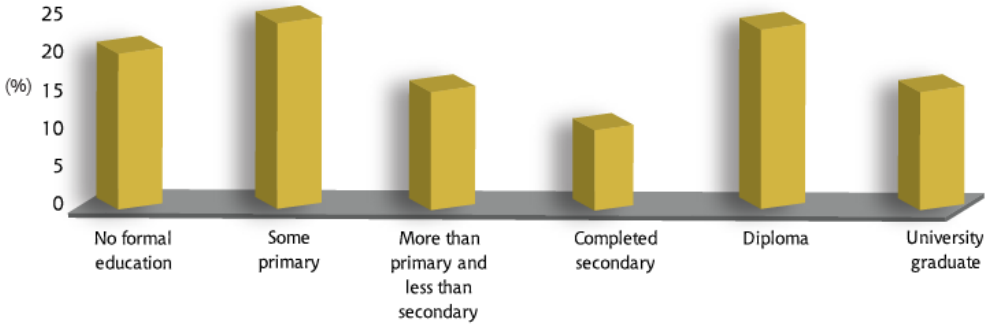


Figure 4. Percentage of the Egyptian population using any tobacco product according to education level.

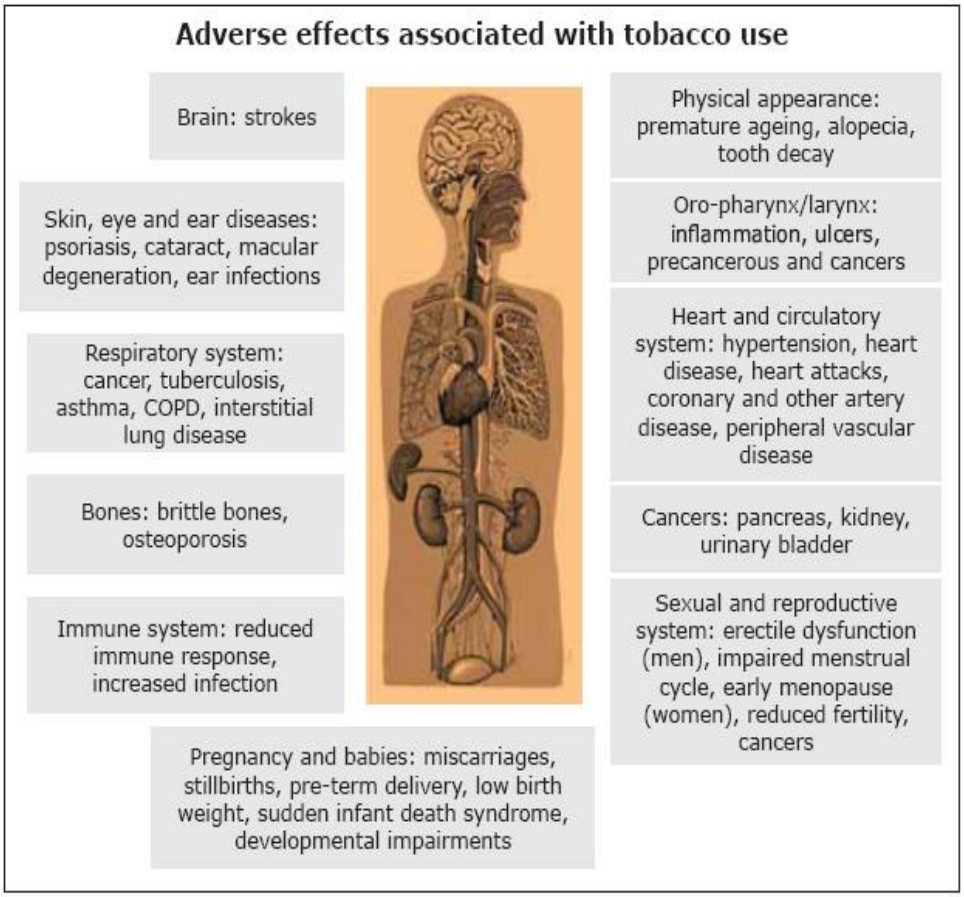
Figure (2, 3, 4): Prevalence of tobacco smoking in Egypt**.**

(Adapted from WHO, Egypt Global Adult Tobacco Survey 2009).

Health Consequences of smoking:

Smoking harms nearly every organ of the body and diminishes a person's overall health (***figure 5***).

Figure (5): Adverse effects associated with tobacco use.



(Adapted from WHO, 2010)

Table (1) : Health effects of waterpipe smoking :

Health effects	Authors
Increased heart rate and blood pressure; nausea and vomiting	Shafagoj et al., 2002
Tuberculosis	Prignot et al., 2008 Al Mutairi et al., 2006
Chronic bronchitis	Mohammed et al., 2008
Low birth weigh	Nuwayhid et al., 1998
Bronchial cancers	Gupta et al., 2001
Atherosclerosis	Ashmawi , 1993
Lip carcinoma	El-Hakim and Uthman, 1999 Lim et al., 2010 Uyanik et al., 2011
Carbon monoxide toxicity	Cavus et al., 2010
Depression	Tavafian et al., 2009
Nicotine addiction	Asfar et al., 2005

(Adapted from Martinasek et al., 2011).

Smoking; A major Risk Factor for Coronary Heart Disease

Smoking is a major risk factor in the development of Coronary heart disease (CHD). Smokers are 2–4 times more likely to develop CHD compared with non-smokers. Smoking exerts these effects by the prominent role it has in the aetiology of atherosclerosis. Also Smoking causes an imbalance in myocardial oxygen supply and demand. An individual who is smoking may have a carboxyhaemoglobin level of up to 15%. This will impair oxygen delivery. Nicotine is a sympathetic stimulant. The resultant increase in heart rate and peripheral vascular resistance increases myocardial oxygen demand. ***(English and Spencer , 2007).***

• **Cigarette smoking:** The clear and linear risk between cigarette smoking and CHD in the developed world is well-established ***(Teo et al., 2006).*** Ezzati and colleagues studied the global burden of cardiovascular disease attributable to smoking using data from the WHO global burden of disease studies as well as American Cancer Society data . They calculated that in 2000, more than 1.62 million cardiovascular deaths in the world, or 11% of the total, were due to smoking .Of the overall total, 1.17 million were among men and 670,000 deaths occurred in the developing world . Smoking-related CHD deaths globally made up approximately 890,000 deaths compared to 420,000 smoking-related cerebrovascular deaths ***(Ezzati et al., 2005).***

• **Other forms of tobacco smoking:** Other forms of tobacco use beyond cigarette smoking increase risk for CHD. Bidis (hand-rolled cigarettes common in South Asia), Kreteks (clove and tobacco cigarettes), hookah (flavored tobacco smoked through a water pipe), and smokeless tobacco are all linked to increased risk for CHD. The combined use of different forms of tobacco is associated with a higher risk of AMI than use one type alone ***(Teo et al., 2006).***

• **Secondhand smoke:** Secondhand smoke (SHS) also has now been well-established as a cause of CHD. ***Barnoya and Glantz*** performed a conservative random effects model and found that SHS was associated with a 1.31 increased risk of CHD (95% CI 1.21–1.41) . Their review of the biological and epidemiological literature on SHS concluded that the effects of chronic SHS exposure on increased CHD risk are substantial, rapid, and nearly as large (80–90%) as those of active smoking ***(Barnoya and Glantz , 2005).*** These observations may explain the large

and immediate drop seen in many communities that implemented smoke-free laws and found 20–40% decreases in admissions for AMI, controlling for time, locality, and other variables ***(Pell et al., 2008).***

Waterpipe smoking

History and background:

Waterpipe smoking is a centuries-old tobacco use method that is increasingly becoming a worldwide phenomenon. The populations in the Eastern Mediterranean region (EMR) are being especially affected by this kind of tobacco smoking. Water pipe is a generic name for tobacco use methods that share a unifying feature involving the passage of smoke through the water before inhalation by the smoker ***(Al-Safi et al., 2009).***

The suggested origins of Waterpipe smoking (also known as Hookah) dated back to the 15th century, when Dr Hakim Abul Fath, during the reign of Emperor Akbar, invented the apparatus in the attempt to create a harmless smoking alternative ***(Shaikh et al., 2008).***

TERMINOLOGY:

Waterpipe, is a generic name for tobacco use methods that share a common feature; passage of smoke through the water before inhalation ***(Asfar et al., 2005).***

Water pipe smoking is known under different names depending on the geographical region of use and the culture; names include “shisha,” “narghile,” “arghile,” “hookah,”

"goza," and the "hubble-bubble" (***Knishkowy and Amitai, 2005***).

Prevalence of shisha smoking:

Hookah (narghile, shisha) smoking is seen as a global tobacco epidemic and there is definitely a lack of sound studies on the hazards related to its active smoking ***(Chaouachi, 2006).*** The main reasons for this are: first, the arrival on the market of new highly flavored tobacco-based mixtures; second, a new type of charcoal used as a quick heating source; third, the pleasure to experiment with an exotic orientalist practice or the desire to return to the corresponding tradition; fourth, the belief that water filtration would lower the risk of smoking. ***(Chaouachi, 2007).***

➢ Prevalence in Eastern Mediterranean Region:

Water pipe smoking is common especially in the countries in Eastern Mediterranean Region (EMR), as it is believed that 20% of adult people living in these countries smoke water pipe. Although little data is available regarding the prevalence of water pipe smoking in EMR, existing data is worrying.Water pipe smoking is also common in Egypt, Syria, and Lebanon. ***(Tavafian et al., 2009).***

➢ Prevalence in Egypt:

- Approximately 3.3% of the Egyptian population are current shisha smokers (6.2% of men and 0.3% of women).
- For men, shisha use is higher for those over age 25 years, for those with less education (> 10% for some primary and no formal education), and for those living in Rural Upper Egypt (9.3%).