



Contents lists available at ScienceDirect

Heart & Lung

journal homepage: www.heartandlung.com

Risk profile of myocardial infarction in young versus older adults

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ARTICLE INFO

Article history:

Received 29 June 2017

Accepted 7 March 2018

Available online

Keywords:

Jordan

Myocardial infarction

Risk

Smoking

Tobacco

Water pipes

ABSTRACT

Background: In developing countries, the number of adults who develop myocardial infarction (MI) at a young age is high. The popularity of waterpipe smoking (WPS) has increased among the same age group. It is unknown if WPS contributes to the incidence of early-onset MI.

Objective: To study the association of WPS with early-onset MI, which is defined as first MI occurring in individuals 18 ≥ age ≤ 45 years compared to those older than 45 years.

Methods: This was a cross-sectional study. The association of WPS with first-time MI was compared between younger and older adults (N = 225).

Results: Twenty-five percent of all participants developed an acute MI before the age of 46 years. Both cigarette and WPS were more common among younger first-time MI patients than older first-time MI patients.

Conclusions: WPS is one risk factor that distinguishes the risk profile of young adults with early-onset MI.

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Introduction

In developed countries, myocardial infarction (MI), a serious consequence of coronary artery disease (CAD), tends to affect people between the sixth and seventh decade of life (e.g., USA: men, 65.3 years; women, 71.8 years).^{1,2} In developing countries, however, MI frequently occurs at a younger age, approximately one decade earlier than that reported in developed countries³ (e.g., Qatar, men, 52 years; women, 63 years).⁴ The Middle East has the highest percentage (11%) of adults who develop their first-time MI before the age of 40 years.^{1,3} In comparison, rates are 4%, 2.7% and 9.7% in North America, Western Europe, and Africa, respectively.^{1,3}

In Jordan, a Middle Eastern country, people lose six years of their expected healthy life mostly because of cardiovascular disease.⁵ Early-onset, or premature, MI is devastating as it limits economic development by causing excessive sick leave, reduced ability to resume work and early retirement among young adults.⁶ Costs of MI related hospitalizations, treatment and rehabilitation also inflate healthcare budgets and strain countries' economies.²

Although young adults may develop MI with normal coronary arteries, due for example to inherited coagulation disorders, the ma-

jority (72%-93%) have CAD.⁷⁻¹⁰ Previous investigators have shown that in addition to male gender, family history of MI, obesity and hyperlipidemia, young patients with MI were commonly cigarette smokers.⁹⁻¹¹ Hbejan demonstrated in a population-based case-control study of adults aged 45 years or less that the risk of MI was two to eight times higher in cigarette smokers, compared to never smokers.¹² The contribution of cigarette smoking to early atherosclerosis and MI has been widely explored.^{13,14} Cigarette smoking is involved in atherosclerotic, and even non-atherosclerotic causes of MI (e.g., coronary artery spasm). Cigarette smoking has a role in vasomotor dysfunction, inflammation, lipid modification, platelet dysfunction and interferes with antithrombotic and prothrombotic factors.^{13,14}

Although waterpipe smoking (WPS; also known colloquially as narghile, argileh, shisha, hubble-bubble and goza) is another common method for smoking tobacco¹⁵ its relationship to early-onset MI has not yet been examined. WPS is a traditional method of smoking moist heated tobacco.¹⁵ It originated in Asia and the Middle East about one hundred years ago.¹⁵ It became widespread after the 1990s when a sweetened, flavored and aromatic tobacco, called "maassel," was introduced.^{15,16} The highest prevalence of WPS is recorded among university and other school students across different countries of the world.^{15,17} In Jordan, WPS has become the most popular method of tobacco use among youth (13-15 years old) with rates of 34.5% in boys and 18.4% in girls.¹⁸ More than 50% of Jordanian university students have smoked a waterpipe and three

Conflict of interest: None.

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quarters of waterpipe smokers started smoking during their adolescence or early adulthood (13–20 years old).¹⁹

Though adverse health effects of WPS have not been widely examined, as it is a relatively new phenomenon, emerging evidence indicates that WPS adds to one's risk for cardiac events. WPS results in the same toxins (e.g., nicotine, carbon monoxide [CO], oxidant gases) that cigarette smoking does and also induces systemic abnormalities (e.g., endothelial dysfunction, dyslipidemia, inflammation, insulin resistance) similar to those seen with cigarette smoking.^{20–22} Given the adverse impact of WPS and also the high prevalence of WPS among young adults, we hypothesized that WPS would be associated with an increasing incidence of MI in young people. Thus, among Jordanian adults with first-time MI, we aimed to investigate the association of WPS with first-time MI in younger and older patients.

Methods

Design, sample and setting

This study was done using data from a cross-sectional study, the purpose of which was to examine the experience of MI among Jordanian adults.^{23–25} In the main study, over one year, 299 patients with MI were recruited from 10 hospitals in two large governorates, Amman and Zarqa. Diagnosis of MI, as recorded in patients' medical records, was verified by checking electrocardiogram changes (ST-segment changes or new left bundle branch block), rise and/or fall of cardiac enzymes (cardiac troponins or MB branch of creatine kinase), and ischemic symptoms. Included patients were oriented, 18 years old or above, developed MI outside a hospital setting and had stable hemodynamics at the time of interview. Patients who had psychiatric illnesses were excluded. For the current investigation, we involved only patients who developed MI for the first time and who had reported their current status of cigarette smoking and WPS. A total of 225 patients from the larger database were included in the current study.

Procedure

The study received ethical approval from the Hashemite University and the participating hospitals and conformed to the principles outlined in the Declaration of Helsinki. The study's aims and participants' rights were explained to eligible participants by research assistants who had a master's degree in nursing. A consent form was signed by patients who agreed to participate in the study. Research assistants interviewed patients at their bedside within 96 hours of their hospitalization. After interview, research assistants reviewed medical records to finalize data collection.

Measurements

Demographic and clinical variables

Demographic variables (i.e., age, gender, marital status, educational level, income, insurance and history of first-degree relative [i.e., parent, sibling, sister, and brother]) were collected via self-report. Clinical variables (i.e., hypertension [HTN], diabetes mellitus [DM], hyperlipidemia and angina) and MI type (ST elevation MI [STEMI], non STEMI [NSTEMI]), as identified in patients' medical history, were collected by medical records review. Body mass index (BMI) was calculated (weight in kg/ height in meter²) based on patients' self-reports of weight and height. Patients were considered obese if their calculated BMI equaled or exceeded the value of 30.

Smoking history

Smoking history was self-reported. Information on CS involved current smoking status (yes, no), intensity of smoking (number of packet/day), duration of smoking in years and having a previous attempt to quit cigarette smoking (yes, no). Information on WPS included current smoking status (yes, no) and frequency of WPS (regular, occasional).

Analysis

The software SPSS (version 19) was used for data analysis. Accuracy of entered data and assumption of tests were verified. Descriptive statistics (mean, standard deviation [SD], range, frequency and percentile) were reported to present sample characteristics. A cutoff point of 45 years old was used, as in previous studies,^{9,26} to classify participants into young and older patients with first-time MI. We examined differences between young and older patients in smoking history using chi-square test for independence, and if needed Fisher Exact Probability test, for categorical variables. Other potential risk factors were also compared between younger and older MI patients using 1) chi-square test for independence, and if needed Fisher Exact Probability test, for categorical variables, and 2) independent sample t-test for continuous variables. P value was set at <.05 for all analyses.

Results

In the total sample, patient age ranged between 23 and 87 years. Above half of the sample were men, married, medically insured, with high school education, earned more than 350 JOD (494 USD) per month and developed STEMI. With regard to risk profile, more than 50% of enrolled patients had HTN and a family history of MI. For every ten patients, more than five, three and two were cigarette, waterpipe and dual smokers (i.e., both cigarette and waterpipe), respectively (Table 1). Among cigarette smokers, duration of cigarette smoking ranged between two and 55 years (average 23.6 years, SD 10.6) and most were (97%) were heavy smokers (≥ 1 packet/day) and close to one half (48%) attempted to quit smoking. Among waterpipe smokers, 65% smoked waterpipe occasionally while the remaining were regular smokers.

Table 1
Sample characteristics (N = 225)

Variable	n (%)
Male	179 (80)
Education	
Illiterate	28 (13)
High school	115 (51)
Above high school	82 (36)
Married	203 (90)
Income	
<200 JOD	23 (10)
201–350 JOD	72 (32)
≥ 351 JOD	129 (58)
With insurance	150 (67)
Family history of myocardial infarction	128 (57)
History of angina	41 (18)
History of diabetes mellitus	101 (45)
History of hypertension	119 (53)
History of hyperlipidemia	104 (46)
STEMI	147 (66)
Obese (n = 200)	54 (27)
Cigarette smoker	127 (56)
Waterpipe smoker	72 (32)
Cigarette and waterpipe smoker	55 (24)

Note: JOD = Jordanian dinar; STEMI = ST-elevation myocardial infarction.

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