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## Correlation of Smoking and Myocardial Infarction Among Sudanese Male Patients Above 40 Years of Age

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### Summary

To find an association between smoking and the development of myocardial infarction in male patients above forty years of age presenting at the echocardiology department of Sudan heart center Khartoum.

A prospective cohort study was carried out at the echocardiography department of Sudan Heart Center in Khartoum-Sudan between July 2012 and June 2014. The study population comprised a total of 168 adult male patients who underwent cardiac ultrasound scanning.

Out of a total of 144 cases, 65% (94) of patients were smokers, 74% of the 94 cases smoked for more than 10 years, and 26% of the 94 cases smoked for less than 10 years.

With this study it was concluded that smoking is a risk factor for the development of myocardial infarction. This study showed that patients with myocardial infarction are more likely to have a past history of smoking.

**MeSH Keywords:**

Echocardiography • Myocardial Infarction • Sudan

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### Background

Myocardial infarction is the major cause of disability and death from coronary artery disease. In various industrialised countries it accounts for 10–25% of all deaths. In approximately 50% of patients the condition is fatal, and many of the remainder suffer from impaired cardiac function [1].

Myocardial infarction occurs when blood supply to a part of the heart is interrupted causing some heart cells to die. This is most commonly due to occlusion of coronary arteries with an atherosclerotic plaque which is caused by chronic inflammatory response in the walls of arteries, caused largely by the accumulation of macrophage white blood cells and promoted by low-density lipoproteins (plasma proteins that carry cholesterol and triglycerides). The classic symptoms include sudden chest pain or compression (typically radiating to the left arm), shortness of breath, nausea, vomiting, palpitations and sweating. The classic signs include increased respiratory rate, cold clammy skin, elevated jugular venous pressure,

hepato-jugular reflex, edema of the legs, gallop, and holosystolic murmur. Approximately one quarter of all myocardial infarctions is silent, without any chest pain [2]. To understand epidemiological study results, it is important to note that many factors associated with MI mediate their risk via other factors [3]. The damage caused by smoking is influenced by the number of cigarettes smoked, whether the cigarette has a filter, and how the tobacco was prepared. Research has shown that smoking reduces the life expectancy by 7–8 years. As many as 300 people die every day in the UK as a result of smoking. According to WHO, 17.1 million people die of cardiovascular diseases every year. The number of people under the age of 70 who die from smoking-related diseases exceeds the total figure for deaths caused by breast cancer, AIDS, traffic accidents, and drug addiction. Non-smokers and ex-smokers can also look forward to a healthier old age than smokers [3]. The risks of smoking for nonfatal MI were found more frequent in the younger population as compared to the Inter-heart or other western studies [4]. Even within largely western populations, the international World Health Organization

**Table 1.** Age groups of patients under study.

Age group	Number	Percentage
<40	24	14.29
≥40	144	85.71
Total	168	100.00

**Table 2.** Habit of patients under study.

Habit	Number	Percentage
Smoking	94	65
Nonsmoking	50	35
Total	144	100

**Table 3.** Age groups of smokers.

Age group	Number	Percentage
40–50	41	43.6
51–60	34	36.2
61–70	14	14.9
≥70	5	5.3
Total	94	100.0

MONICA (multinational monitoring of trends and determinants in cardiovascular disease) project recently reported a nearly fivefold elevation in the risk for non-fatal MI associated with current smoking in younger men [5].

## Material and Methods

### Study design and population

This prospective cohort study was performed in the period from July 2012 to September 2014. The participants were scanned at the ultrasound department of the Sudan Heart Center in Khartoum, Sudan. All males aged 40 or above, with myocardial infarction, were included as cases. The definite diagnosis of MI was based on the clinical examination and echocardiography. Inclusion criteria for cases were: age of 40 years, male sex, known case of MI. The exclusion criterion was age above 40 years. The collection of data was carried out via a questionnaire. Permission was obtained from the ethical board of the institution and patients. A total of 144 men met eligibility criteria.

### Technical information

Echocardiography studies were performed using MyLab 50 XVision-Esaote echocardiography machine equipped with a 2.5-MHz phased array probe, with a small footprint for peeking in between ribs. A water-soluble gel was used to produce airless contact between the transducer and the patient's chest. Printing facilities were issued

through a digital graphic ultrasound printer (made by Sony Corporation, Japan), 100 V, 1.5 A, and 50/60 Hz.

### Statistical analysis

Data were initially summarized as mean  $\pm$ SD in a form of comparison tables. Statistical analysis was performed using the standard Statistical Package for the Social Sciences (SPSS Inc., Chicago, IL, USA) version 15 for windows. *P*-value terms such as equal and less were used for significance; *P*-value ( $P < 0.001$ ) was considered to be significant.

## Results

From the population that underwent heart ultrasound, 144 male patients were above 40 years of age (Table 1).

Out of the examined participants, a total of 94 (65%) subjects were smokers and 50 (35%) subjects were nonsmokers (Table 2).

In the study population, 41 subjects were in the age group of 40-50 years, representing 43.6% of the population. The age group above 70 years was the smallest (5.3%) of the population (Table 3).

Seventy-four percent of the 94 cases smoked for more than 10 years, while 26% of the 94 cases smoked for less than 10 years (Table 4).

**Table 4.** Duration of smoking.

Duration	Number	Percentage
3 to 5 years	12	13
6 to 10 years	12	13
10 to 20 years	70	74
Total	94	100

## Discussion

Our study revealed that the percentage of the elderly MI patients ( $\geq 40$ ) than that of young MI patients ( $< 40$ ), i.e. 144 patients in the old group (85.71%), and 24 patients in the young group (14.29%). This finding was supported by Kam et al. [6] who found that elderly MI patients were more likely compared to young MI patients, and also by Novella et al. [7] who indicated that the incidence of fatal and non-fatal myocardial infarctions was very high in the elderly population of Madrid, and by Fournier et al. [8] who stated that young patients with AMI (acute myocardial infarction) represented 4.1% of the patients with AMI admitted to our hospital between June 1986 and December 1992.

Two western studies have already documented that the risk factors for smoking are more extreme (even lower absolute risks) at younger ages [5]. Smoking is now considered to be an important risk factor for the development of cardiovascular diseases like in many other diseases. A cohort study was conducted by Prescott et al. [4] in which 11472 women smokers and 1319 men smokers were followed up for a mean of 12.3 years. From among those patients, men showed a greater incidence of myocardial infarction than women, i.e. 1251 cases against 512, respectively [9]. A case-control study conducted by Inter-heart in 52 countries showed a positive correlation between smoking and the development of MI [10].

In our study we found that increase in the duration of smoking increased the incidence of myocardial infarctions. That finding was in agreement with Doll et al. [10] who reported that a positive correlation can be found as far as the duration of smoking is concerned with a 10–20-year smoking history in 49% of cases as compared to only 7% of controls.

## Conclusions

Smokers have a higher risk of myocardial infarction than non-smokers, as the odd ratio comes out to be 3.71, which is significant. Moreover, smoking is harmful as regards the ischemic heart disease, possibly because of the constituents of the tobacco smoke. However, there are certain aspects of risk factors which must be considered as well, like family history, hypertension,

obesity, etc. The implication for tobacco control is clear: reduced smoking will reduce the leading cause of adult death in Sudan. Our results add an additional impetus in particular to smoking cessation: among about 70–80 million males over the age of 30 that smoke [11], vascular disease, tuberculosis and cancers are the major cause of premature mortality and disability. Avoidance of a tobacco-related disease in the next few decades will require current smokers to quit, with the greatest benefits if quitting occurs before the onset of the disease [12].

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