A Study of Carboxyhaemoglobin Levels in Cigarette and Sheesha Smokers in Saudi Arabia

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Abstract: A single carboxyhaemoglobin (COHb) estimation of late evening blood sample among non-smokers, cigarette smokers, and sheesha smokers was evaluated among Saudis. The COHb level in smokers of 15 to 40 cigarettes a day ranged between 0.7 and 10.3 with a mean value of 6.1 ± 2.58 COHb. Values among sheesha smokers ranged between 6.5 and 13.9 with a mean value of 8.8 ± 1.83, significantly higher than those of cigarette smokers (P < 0.001) for a given degree of exposure to tobacco smoke. (Am J Public Health 1982; 72:722–724.)

Introduction

Extensive work has been done on the hazards of cigarette smoking. While carcinoma has been well established as causally related to cigarette smoking, Stirling has reported a surprisingly low incidence of lung cancer (in comparison to other cancers) among Saudis despite widespread prevalence of sheesha smoking among these subjects. There are no studies specific to the risk of tobacco-related diseases among the Saudis.

Sheesha (Figure 1) is a device widely used in Saudi Arabia to smoke Jurak, a dark colored paste, imported from India, which is produced when a mixture of tobacco, pulpy fruit (e.g., banana) and molasses are all cooked together. About 200 grams of this paste containing roughly about 30 grams of tobacco is burned in this device. Jurak smoke has a pleasant, fruity odor. Fifteen minutes smoking of Jurak would provide approximately the same amount of tobacco smoke as one cigarette. In recent years, quite a few Saudis have taken to cigarette smoking also.

Methods

Subjects were randomly selected from among the staff members and students of King Abdulaziz University Teaching Hospital, Jeddah, and their relatives and friends. All were healthy Saudi Arab males 21–54 years of age, living in and around the metropolitan city of Jeddah. They were categorized into three groups:

- Non-smokers (comparison group)*
- Cigarette smokers (smoking 15 to 40 cigarettes per day)
- Sheesha smokers (smoking 15–30 grams of tobacco as Jurak in combination with other materials)

The time chosen for the study and the sampling of blood was late evening between 9:00pm and 10:00pm. Subjects who smoked were asked to do so in their usual manner, using their own brand of cigarette or Jurak. The only stipulation was that the subject must have smoked at least one cigarette or Jurak for a minimum of 15 minutes, within half an hour prior to taking blood samples. COHb was estimated by Spectro-photometric method. The presence, if any, of acute symptoms of transient CO poisoning such as dizziness, headache, blurred vision, and palpitations in each of the subjects either during or immediately after smoking were noted.

*Persons smoking less than 15 or more than 40 cigarettes per day were very few in number. Therefore, such subjects were not chosen as being representative of an average smoker.
Results

Table 1 shows the COHb in the three categories of subjects with significance of variation. Differences between all three groups were highly significant. The highest levels were found in sheesha smokers.

Headaches were reported by 58 per cent of the sheesha smokers and 41 per cent of the cigarette smokers. The respective figures for blurred vision were 50 per cent and 26 per cent, for palpitation 46 per cent and 22 per cent, for dizziness 46 per cent and 25 per cent.

Discussion

COHb levels in non-smokers represent the background level in blood, contributed by the endogenous production and the ambient levels of CO. Ambient CO levels in Jeddah ranged between 15 to 20 ppm in the suburban area and 50 ppm in the city at the peak of traffic hour.** Lawther and Commins found that this value does not exceed 2.5 per cent values by other workers ranged between 1.9 to 2.6 per cent.

COHb levels in cigarette smokers represent the rise due to the cigarettes smoked over and above the background levels. COHb levels in cigarette smokers show wide fluctuation during 24 hours. COHb levels in blood at any given time are affected by the CO from a recent smoke, amount of tobacco, and mode of smoking with reference to the frequency of puffing and depth of inhalation; the time elapsed since the last smoke; the degree of physical activity indulged in by the subject in the period following a recent smoking episode and immediately prior to the drawing of blood sample; the smoking pattern in the immediate past 24 hours; and the time of the day of drawing of the blood samples. The COHb level over and above the background level at any time during the day may be considered to be the algebraic sum of the individual rises from each smoke and falls due to decaying at a rate proportional to the activity of the subject and time elapsed since the last smoke. Previous researchers have established that the later in the day the time of sampling the

**Personal communication dated May 12, 1980, from the General Directorate of Meteorology and Aviation, Kingdom of Saudi Arabia.
better the approximation of this single COHb estimate to the actual degree of exposure to tobacco smoke in a given subject.\textsuperscript{12,13} Therefore, late evening (9:00pm to 10:00pm) was chosen for drawing of blood samples for COHb estimation. Values found in cigarette smokers were similar to those reported by others.\textsuperscript{1,12} COHb levels among sheesha smokers were significantly higher.

In sheesha, the smoke passes first through water. Nicotine and other water soluble hydrocarbons present in the smoke are dissolved and retained by water to various degrees. Whether the low reported incidence of lung cancer\textsuperscript{a} in Saudis can be attributed to retention in sheesha water of soluble hydrocarbons which may be carcinogenic is being studied further.

Although the trends are clear, the number studied is small. A larger study is planned on the effects of CO resulting from sheesha smoking in Saudi Arabia.

REFERENCES


Fellowships Available in Psychiatric Epidemiology/Biostatistics

The Department of Mental Hygiene, Johns Hopkins University School of Hygiene and Public Health, is inviting applications for NIMH-funded Post-Doctoral and Predoctoral Training Fellowships in Psychiatric Epidemiology and Biostatistics for the 1982–83 academic year. The objective of the postdoctoral program is to provide an interdisciplinary learning experience for persons who have completed doctoral training in Psychiatry, Sociology, Biostatistics, Social Psychology and related subjects and who wish to pursue careers in mental health research, with emphasis on psychiatric epidemiology and biostatistics of mental disorders. Relevant experience may include research experience, teaching, internship, residency, or time spent in fulltime pursuit of additional degrees or full-time studies in a health related field at a level beyond that of the qualifying doctoral degree. The objective of the predoctoral program, which leads to a Doctor of Science degree, is to enable qualified students to obtain advanced training in biostatistics and epidemiology with special reference to the application of these two basic sciences of public health to research on the epidemiology of mental disorders and the evaluation of programs for the prevention and control of these disorders. Applicants must have at least a bachelor’s degree in arts or science.

Resources of the Departments of Biostatistics and Epidemiology of the School of Hygiene and Public Health and of the Medical School’s Department of Psychiatry and Behavioral Sciences are also utilized. For further information and application forms, address inquiries to Morton Kramer, ScD, Department of Mental Hygiene, Johns Hopkins University School of Hygiene and Public Health, 615 N. Wolfe St., Baltimore, MD 21205, Tel: 301/955-5868.

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