

Carbon Monoxide Concentration in Exhaled Air in Smokers and Non-smokers in São Paulo City, Brazil

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ABSTRACT

- São Paulo is one of the biggest cities in the world; there are more than 5 million cars in the streets and carbon monoxide (CO) is one of the most important pollutants from vehicles. CO is also one of the most dangerous products of cigarette smoke.
- Our objective was to verify the CO concentration in smokers and non-smokers in São Paulo City.
- A cross-sectional study involving 582 healthy subjects was performed. The CO concentration was measured using micro-smokerlyzers (Bedfont EC Scientific).
- Subjects were divided into two groups: smokers (412) and non-smokers (170). The CO concentration was significantly higher in smokers (22.4 parts per million [ppm]) than non-smokers (3.4 ppm).
- There was a direct relationship between CO concentration and number of cigarettes smoked, which was independent of sex and age.
- Smoking overcomes the influence of environmental exposure to CO concentration in human airways.
- Cigarette consumption is an important determinant of the CO concentration in exhaled air.

OBJECTIVE

- To verify the CO concentration in exhaled air in smoking and non-smoking residents in São Paulo.

METHODS

- We performed a cross-sectional study in 582 healthy subjects in São Paulo City.
- The study was performed during 1 day, between 9 AM and 5 PM.
- The CO concentration in the study area is systematically evaluated by the CETESB (Company of Technology of Environmental Sanitation) through the use of equipment for detection of pollutants.
- CO was measured using a micro-smokerlyzer (Bedfont EC Scientific). The determination of CO concentration in smokers was made at least 30 minutes after smoking.
- Only healthy subjects were admitted in the study. Cigarette consumption is an important determinant of CO concentration.
- We analyzed cigarette consumption, age, and gender.

RESULTS

- CO concentration in non-smokers was 3.4 ± 2.9 ppm (170 subjects, **Figure 1**).
- CO concentration in smokers was 22.4 ± 10.1 ppm (412 subjects, **Figure 1**).
- Smokers were analyzed considering the cigarette consumption of 1–10; 11–20; and >20 cigarettes/day (**Table 1** and **Figure 2**).

Table 1. Cigarette consumption

	N	CO mean	SD
1–10	92	13.8 ppm	7.5
11–20	240	22.3 ppm	9
>20	80	29 ppm	11

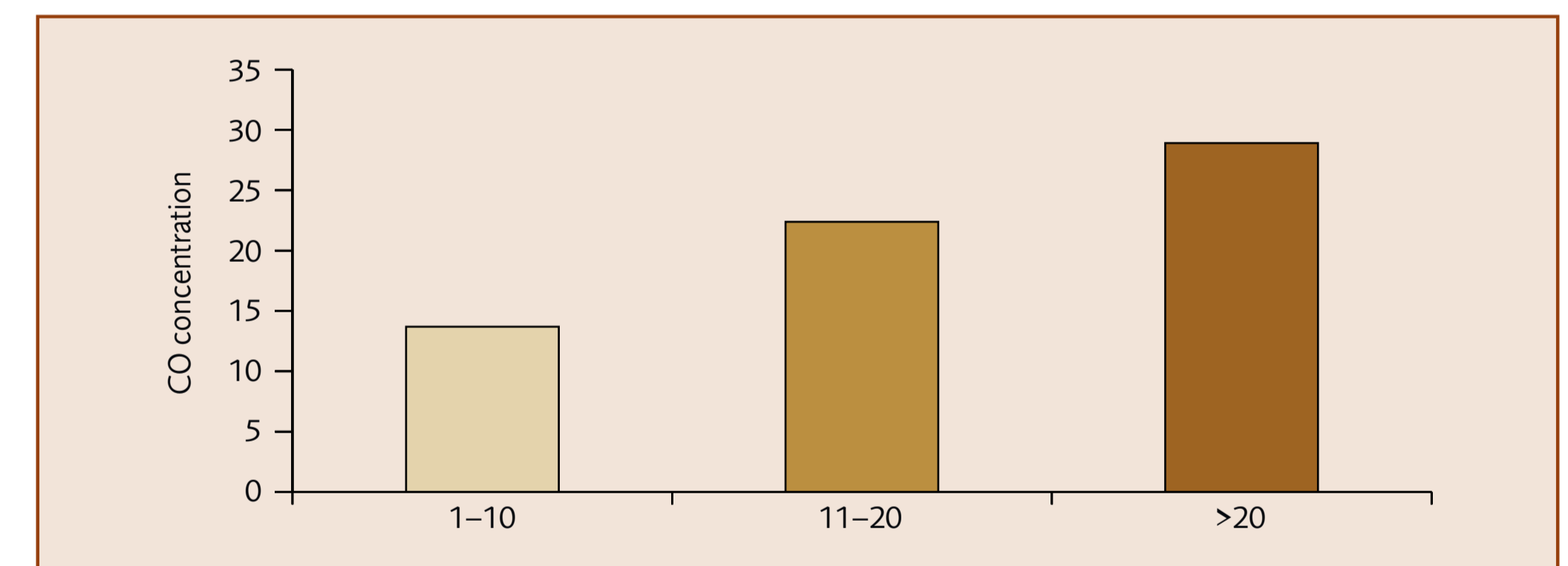
- CO concentration was directly related to cigarette consumption ($P < 0.01$) independent of age and gender.
- The 8 hours average of CO concentration in study area was 8.9 ppm (CETESB analyzer).



Figure 1. CO concentration in São Paulo residents



Figure 2. Cigarette consumption



CONCLUSIONS

- Smoking overcomes the influence of environmental exposure on CO concentration in human airways.
- Cigarette consumption is one important determinant of CO concentration.
- The cut-point of 9 ppm, usually considered a parameter in many trials of smoking cessation should be reviewed, because it is much higher than the CO concentration in non-smokers in São Paulo.
- The CO concentration in the study area during the day of study was adequate by international parameters of quality of air (<9 ppm).