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Mass carbon monoxide poisoning among television viewers of a football match☆

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Abstract
Background: The objective was to study a mass carbon monoxide (CO) poisoning and the characteristics of the asymptomatic cases.
Methods: On the 2nd of February, 2015, a group of more than 30 television viewers of a football match contacted the emergency department due to suspected CO poisoning from a butane stove. A visual inspection of the location of the exposure and a descriptive epidemiological study were conducted. Based on the type of variable, the presence of a statistical association was studied with Fisher's exact test or the Kruskal–Wallis test.
Results: Thirty-four of the 39 individuals were affected (87.2%). The exposed individuals had a mean age of 43.8 years (SD, 22.1), and 28.2% (11/39) were women. The time of exposure was 52.4 min (SD, 21.0), and the mean distance from the oven was 4.2 m (SD, 2.5). The most common symptoms were headache (50%), nausea (20.6%), weakness (20.6%) and dizziness (14.7%). The carboxyhaemoglobin (COHb) levels were very high (13.8 ± 5.8%). Some 97.1% of the individuals required oxygen therapy, and 39.4% required hyperbaric chamber treatment. Some 29.5% of the cases had no symptoms but showed COHb levels similar to those that did have symptoms (13.6% vs. 15.3%, nonsignificant difference). The asymptomatic cases had a shorter exposure time (38.3 min vs. 53.3 min; $p < .036$).
Conclusions: Almost a third of the exposed individuals were asymptomatic, even with COHb levels similar to those of the symptomatic patients, and the majority of these asymptomatic patients even required oxygen treatment in a hyperbaric chamber.

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PALABRAS CLAVE
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Brote masivo de intoxicación por monóxido de carbono en los telespectadores de un partido de fútbol

Resumen
Introducción: El objetivo fue estudiar un brote de intoxicación por monóxido de carbono (CO) y las características de los casos asintomáticos.
Métodos: El 2 de febrero de 2015 un grupo de más de 30 telespectadores de un partido de fútbol contactó con el servicio de urgencias por una supuesta intoxicación por CO procedente de una estufa de butano. Se realizó una inspección ocular del local de la exposición y un estudio epidemiológico descriptivo. Según el tipo de variables, la existencia de una asociación estadística se estudió con la prueba exacta de Fisher o el test de Kruskal–Wallis.
Resultados: Se vieron afectados 34 de 39 sujetos (87,2%). Los expuestos tenían una media de edad de 43,8 años (DE = 22,1) y el 28,2% (11/39) eran mujeres. El tiempo de exposición fue de 52,4 min (DE = 21,0) y la distancia a la estufa de 4,2 m (DE = 2,5). Los síntomas más frecuentes fueron cefalea (50%), náuseas (20,6%), pérdida de fuerza (20,6%) y vértigo (14,7%). Los niveles de carboxihemoglobina (COHb) fueron muy elevados (13,8% ± 5,8). El 97,1% precisó oxigenoterapia y el 39,4% tratamiento en cámara hiperbárica. Un 29,5% de los casos no presentaron síntomas, y respecto a los casos sintomáticos, estos mostraron niveles similares de COHb (13,6% vs. 15,3%, diferencia no significativa), pero un tiempo de exposición inferior (38,3 min vs. 53,3 min; $p < 0,036$).
Conclusiones: Casi una tercera parte de las personas expuestas fueron asintomáticas aun con niveles de COHb similares a los casos sintomáticos, e incluso la mayoría precisaron tratamiento con oxígeno en cámara hiperbárica.

Background

Carbon monoxide (CO) poisoning is a common reason for emergency department visits.[1–3] CO is a colorless, odorless and nonirritating gas. Its affinity for hemoglobin is 200-fold greater than that of oxygen and therefore forms carboxyhemoglobin (COHb) even with minor exposure.[4] Exposure to moderate quantities causes headaches, nausea, muscle weakness and dizziness, which can imitate the common cold and is often incorrectly diagnosed.[4,5] More significant poisonings are potentially severe and can cause confusion, seizures, loss of consciousness and even death.[1,6]

The measurement of COHb levels is indicated for the diagnosis, although its reliability decreases as the length of time since the exposure increases.[4] The COHb levels depend on numerous factors, such as the magnitude of the exposure, alveolar ventilation, blood volume and metabolic activity. In adults at rest, these levels are mainly influenced by the level of CO in the environment and the duration of exposure.[4] A COHb level greater than 3% in nonsmokers or greater than 10% in smokers confirms CO exposure.[4] However, a number of studies have indicated that COHb levels do not correlate with the presence or absence of initial symptoms or with subsequent sequela, which can be attributed to inflammatory mechanisms triggered by the poisoning more than to the hypoxia itself.[7] Detecting asymptomatic poisoned individuals is unusual given that people are generally only admitted to emergency departments if they have some type of symptom.[8,9]

The aim of this study was to report a mass CO poisoning that affected a large group of television viewers of a football match and to compare the symptomatic confirmed cases with the asymptomatic ones.

Methods

On February 2, 2015, the epidemiology unit of Lleida was notified that more than 30 individuals from a football group had contacted the emergency department of University Hospital Arnau de Vilanova of Lleida the previous night due to alleged CO poisoning from a butane stove in a social setting. An epidemiological study was designed to report the mass poisoning, the individuals affected and the factors associated with the poisoning and with the presence of clinical symptoms.

The local government and those responsible for the football group were contacted, and a comprehensive list of the individuals exposed was obtained. A visual inspection of the locale where the exposure took place was conducted, during which the presence of a butane stove for outside use was confirmed. An epidemiological survey of those exposed individuals was conducted, and their medical histories were reviewed. We collected information on epidemiological (time of exposure and distance from the stove), clinical (history of chronic diseases, toxic habits and symptoms), laboratory (COHb levels) and treatment (oxygen and hyperbaric chamber) variables. We used the definition of ''confirmed case'' of the Centers for Disease Control (Atlanta, US): nonsmoker patient with COHb levels >5% or