K20 A Retrospective Analysis of Deaths Due to Carbon Monoxide (CO) Poisoning Reported at a Tertiary Care Center in New Delhi, India, From January 2010 to January 2015

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After attending this presentation, attendees will better understand suspected cases of CO poisoning depending on history, environment in which the deceased is found, and various findings at the time of autopsy.

This presentation will impact the forensic science community by helping attendees understand the various autopsy/pathological findings that are seen in a typical case of CO poisoning as well as obscure findings that are often missed or confused with other causes of death as these are quite atypical. This study will have a greater implication over large metropolitan cities of India, where large numbers of migrating individuals are living in overcrowded shelters. Though being significantly at risk, they still remain oblivious to the fatal nature of such a poisoning. The sudden and incumbent nature of this fatality is not well reported or dealt with in the subcontinent, thus resulting in a preventable loss of life. The suddenness of the events leave the relatives of the deceased unable to cope with this sudden and seemingly inexplicable demise.

CO poisoning is one of the leading causes of poisoning deaths in the United States, accounting for approximately 40,000 emergency department visits and 5,000-6,000 deaths per year, a significant number of which are accidental and thus preventable.[1,2] These types of deaths are relatively uncommon in tropical countries, like the subcontinent of India, where artificial heating and closed habituation are not quite as prevalent. But, with changing social demographics and the adoption of modern household technology, the need for awareness has also increased. The sources of CO may be as innocuous as smoke and fumes from gas geysers, stoves, water heaters, burning oil lamps, etc.; products that are used in common households which do not have an actual visible flame. Another common source, typically used for suicidal CO poisoning, are automobile exhaust fumes.

CO is a colorless, odorless, lighter-than-air gas, whose level in ambient air, when less than 0.2ppm, is not harmful to humans. There are usually no signs or symptoms between the levels of 1ppm to 70ppm.[3] CO poisoning is a type of hypoxic condition. CO binds to hemoglobin with 250 times more affinity than oxygen.4 Thus, even if oxygen is available in the environment, the body is unable to utilize it (best explained by the age-old adage: "Water, water, everywhere, Nor any drop to drink"), a condition classified as anemic hypoxia.[5] The acutely affected subject becomes lethargic and is unable to take appropriate action.

A total of 28 cases of death due to CO poisoning (accidental and suicidal) brought to the All India Institute of Medical Sciences (AIIMS) mortuary over a period of five years, between January 2010 and January 2015, were analyzed. Of these, 82.1% of the cases were from a low socio-economic status. This may be due to the fact that in sub-urban regions of India, coal, wood, and cow-dung cakes are used as a source of heat; this conclusion was strengthened by crime scene visits. Cherry red discoloration was present in 42.9% of the cases, and blisters containing pink fluid were present on the calves and buttocks in 28.6% of the cases. Surprisingly, serous effusions such as pleural and pericardial effusions were seen in 64.3% of the cases and generalized congestion was observed in nearly all cases. Apart from CO, alcohol was present in 39.3% of the cases, with an average of 162.3mg%. Toxicological analysis of the viscera report was negative in 7.1% of the cases, but circumstantial findings, such as partially burnt coal or wood, were present in a poorly ventilated rooms.

To conclude, this study will enable attendees to become more aware and have better insight into the circumstances and autopsy findings in suspected cases of death due to CO poisoning. This study also sheds light on the need for specific protocols that should be followed in all suspected cases of CO poisoning. Also, this study will inspire the forensic community to plan and implement various steps required to educate the masses regarding the prevention of CO poisoning.

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