

Case report**Accidental carbon monoxide Poisoning**

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**Abstract:** Carbon monoxide poisoning is quite common in developing countries and developed countries as well. In India suicidal carbon monoxide poisoning is very common, but accidental poisoning of carbon monoxide occurs sometimes in winter season. Generally carbon monoxide poisoning occurs due to use of fossil fuel for the purpose of heating the room and furnaces, due to ignorance of people who do not know that it can lead to complication even death. We often read in newspaper that a family those used coal furnaces inside the closed doors found dead in morning due to carbon monoxide poisoning. Common source of carbon monoxide include tobacco smoking, automobile exhaust ,industrial processes, unvented or faulty heating units(stove, water heater or furnace)and fires. Coal gas( mixture of carbon monoxide ,methane and hydrogen).Carbon monoxide poisoning mortality may be prevented if patient reaches to the hospital within time. This case report is concerned with accidental poisoning of five persons with carbon monoxide those were admitted in Rama Medical College Hospital & Research Centre Mandhana, Kanpur U.P. All of the patients survived after resuscitation and follow up treatment. This case is reported with advice on awareness about carbon monoxide poisoning which can occurs without warning.

Keywords: Carbon Monoxide; Poisoning

**Introduction**

Carbon monoxide is a colourless, odourless, tasteless and non irritative toxic gas that is a product of incomplete combustion. The common source of CO includes coal gas, smoke from fire and fumes from defective heating appliances e.g. Furnace, stove, water heater, fire places, burning oil lamps, generator. In India accidents occur in connection with incomplete combustion of wood charcoal and coal in ill ventilated room(1).

Carbon monoxide is readily absorbed across the alveolus and combines with hemoglobin. Normal blood contains 20% of oxygen with 18% bound to hemoglobin and 2% dissolved in plasma. About 10-20% CO is present in extracellular tissue combined with myoglobin. CO affinity to myoglobin is about 40 times greater than oxygen which may cause direct myocardial depression. CO has 200 to 300 times greater affinity for hemoglobin than that of oxygen. It displaces oxygen from its combination with Hb and forms a relatively stable compound known as carboxyhemoglobin. CO is a potent cellular toxin. It effectively and firmly binds to hemoglobin and myoglobin. It inhibits the electron transport by

blocking cytochrome A<sub>3</sub> oxidase and cytochrome P-450 and therefore intracellular respiration, development of clinical symptoms has a progressive roughly parallel to the rise in the saturation of blood by CO, similarly regression of symptoms corresponds with the clearance of CO from the blood.

Inhaling CO can cause headache, drowsiness, irritability reduced judgement and motor skills, convulsions, unconsciousness, coma and death. Death in otherwise fit people occurs on carboxyhemoglobin concentration of about 50%, though lower levels may be fatal in people with coronary artery diseases or if O<sub>2</sub> demands are higher, as during exercise, long term sequelae may include myocardial and cerebral infarction. In about 10% of survivors a neuropsychiatric syndrome occurs that may include extrapyramidal signs due to damage to basal ganglia, amnesia and psychotic symptoms. (2,3,4,7)

**Symptoms and Signs at Various concentration of carboxyhemoglobin - ( 5,6 )**

0-10%	None
10-20%	Tightness across the forehead, slight headache dilatation of cutaneous blood vessels

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- 20-30% Headach and throbbing in the temple  
 30-40% Severe headach, Weakness, dizziness, diminution of vision, nausea, vomiting, collapse.  
 40-50% As Above, greater possibilities of collapse,increased pulse and respiratory rate.  
 50-60% Syncope,increased pulse and respiratory rate,intermittent convulsions,cheyne stokes respirations.  
 60-70% Coma,intermittent convulsions,depressed cardiac and respiratory functions, possible death.  
 70-80% Weak pulse,slow respiration death within hours.  
 80-90% Death in less than one hour.  
 90-100% Death within minutes.

### Case history

Five young mess workers aged between 20years to 30 years after cooking food slept in a room at around 9:00pm and they arrange a furnace and burn coal to keep their room warm. They closed the doors and windows.

At 11:00pm one of them woke to go toilet but as soon as he stood he felt dizzy and fell down .Noise produced by his fall awakened all the persons, they tried to open the door but could not do so due to dizziness and some sort of diminution of vision. A person was passing in front of the room heard the noise, he saw from the window that all of the persons were struggling to open the door, then he broke the door with the help of another person. All of the persons were brought immediately in the emergency department of the medical college and were admitted in ICU in the state of altered sensorium. In the ICU 100% oxygen was administered initially in all of them, in about half an hour they regained consciousness with complains of headache,dizziness,nausea and vomiting.All of them had tachycardia and dyspnea.BP was within normal range.Supportive treatment and lower concentration of oxygen was given for few hours. On the next day they became stable and oxygen saturation become 100% without O<sub>2</sub> . All of them were discharged after 48 hour.

### Diagnosis:-

The diagnosis should be based on direct measurement of COHb levels in arterial or venous

blood by co-oximetry.Inability to differentiate oxyhemoglobin from COHb limits the use of pulse oxymeters. The measurement of acid-base balance, plasma lactate levels, and bicarbonate are helpful in management of CO poisoning with accompanying lactic or metabolic acidosis.

### Management

The half-life of carboxyhemoglobin is 250min (adult male) in room air and 40 to 60 min in a person breathing 100 percent oxygen at 1 atmosphere (atm).Those value are 30 percent shorter in females.therefore all fire victims should be isolated from fire site and given 100 percent oxygen en route to the hospital.This allows delivery of an inspired oxygen concentration of 50 to 60 percent,which is usually adequate.To adequately treat CO poisoning it is important also to establish COHb level as early as possible.In a patient with loss of consciousness,cyanosis or an inability to maintain the airways,100 percent oxygen should be delivered via mechanical ventilation through endotracheal tube until the carboxyaHb drops below 10 to 15 percent.Use of a hyperbaric chamber is desirable if one is available and is advisable if the patient has been unconscious,even if recovery has occurred,in order to prevent the neurological complications.(2,3,4,7)

### Discussion

Carbon monoxide poisoning accounts of approximately 3500 death in the united states annually. In a review of death certificate data from 1979 to 1988, there were over 5000 death each year from CO poisoning (8). Accidental CO poisoning occurs in winter from the use of defective or improperly installed household appliances that operate on comustible fuel (gas, oil, coal and kerosene).Approximately 2 million death certificate are filed in the united states. During the 10 year period from 1979-1988, exactly 56,133 death certificate contained codes addressing CO as a contributing cause, 25,889 (46%) were suicidal, 15,523 (28%) involved burn or fires, 210 were deemed homicides, and 11,547 (24%) were categorized as unintentional. Of unintentional fatalities, 57% were associated with automobile

exhaust. The unintentional death rate has declined by 63 per year during the 10 years period from 1979-1988. Carbon monoxide is a highly poisonous gas, which is absorbed through lung and readily combines with the hemoglobin of red blood corpuscles to form a stable compound known as Carboxyhemoglobin and then reduces the oxygen carrying capacity of blood. Sources of CO includes house fire, faulty furnaces heaters. Wood burning stoves, internal combustion vehicle exhaust, electrical generators, Propane filled equipment such as portable stoves and gasoline powered and welders.

**Conclusion:** The present case occurred due to unawareness of about CO poisoning in closed space. During the use of coal furnaces doors as well as windows should be not closed and people should be aware about CO poisoning and its consequences.

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