

Suicide by Charcoal Burning in a Patient on Zolpidem Therapy: A Case Report

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Abstract

Background: Charcoal burning causes death through carbon monoxide (CO) poisoning, leading to hypoxia and fatal pathological changes. Zolpidem, a hypnotic for insomnia, can short term and long-term side effects. Combined with psychological stressors, it may increase the risk of suicide.

Case Presentation: We report a case of a 49-year-old male, a non-smoker with no known comorbidities, suspected of committing suicide at his residence. The individual who was a businessman, had been experiencing significant financial difficulties. A strip of Zolpidem was found at the scene, with two tablets missing. The external and internal findings were consistent with CO poisoning, exhibiting the characteristic pink hypostasis and discolouration of mucous membranes and nail beds. Internally, the organs displayed pinkish hues typical of CO exposure, along with haemorrhagic changes in the gastric mucosa. Toxicological result was positive for Zolpidem with level of 0.04 micrograms per millilitre and carbon monoxide could not be analysed because of blood decomposition changes.

Conclusion: Autopsy and scene findings can support a diagnosis of carbon monoxide poisoning when toxicology results are delayed or limited. In this case, financial stress and possible suicidal ideation from long-term Zolpidem use may have contributed, highlighting the need for cautious prescribing and improved mental health awareness.

Key words: Charcoal burning, Suicide, Carbon monoxide poisoning, Zolpidem, Autopsy

Background

Charcoal burning as a method of suicide is increasingly prevalent in East and Southeast Asia, particularly in Malaysia, China, Hong Kong, Korea,

and Taiwan. In Malaysia, it ranks as the third most common method of suicide, driven partly by cultural perceptions of it being a painless and peaceful death, often linked to beliefs in “rebirth” or a new life. This

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method is most common among young adults aged 25–45 and individuals with psychiatric illnesses.¹

Carbon monoxide (CO) poisoning occurs due to exposure to CO, a colourless, odourless gas released from sources such as defective appliances, industrial processes, vehicle exhaust, heating systems and charcoal burning.² It poses severe risks, especially to vulnerable populations, including children, the elderly, and individuals with anaemia or cardiovascular diseases. Fatal outcomes from CO poisoning depend on factors such as gas concentration, exposure duration, ambient temperature, physical activity, respiratory rate, and body position during exposure.³

Zolpidem, a non-benzodiazepine sedative-hypnotic medication used to treat insomnia, has been linked to increased risks of suicidal behaviour, even in individuals without a prior history of psychiatric illness.⁴ Additionally, zolpidem can induce respiratory depression, which may compound the risks of fatal outcomes when combined with other factors such as carbon monoxide exposure.⁵ Zolpidem is marketed under several brand names such as Zopim, Ambien, Stilnox and Edluar.⁶

Case Presentation

A 49-year-old male was found dead on the couch inside his enclosed room, with the doors and windows were locked from the inside. A burnt charcoal pot, a box of matches, and a lighter were discovered in the room. Additionally, a strip of medication labelled 'ZOPIM' was found, with two 10mg tablets missing. The deceased was a non-smoker, with no known medical illness. He was a businessman experiencing severe financial difficulties before his death. Based on the circumstantial evidence, the Investigating Police Officer concluded that the death was unnatural and attributed it to suicide.

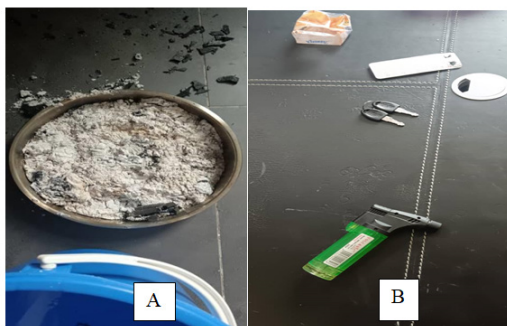


Fig.1 A. Burnt charcoal pot. B. Lighter was found near the couch where the body was located.

C. Box of matches nearby. D.10 mg strip of ZOPIM, with two tablets missing, was also found in the room.

Autopsy findings

Autopsy revealed a well-nourished adult male with no external injuries to the body. A cherry-pink hypostasis was observed at the posterior aspect of the body (Fig. 2A). Additionally, pinkish discoloration was noted on the nails, conjunctiva, and mucous membranes. During the dissection, a similar pinkish discoloration was observed in the soft tissues, heart, lungs, stomach and the small intestine (Fig. 2B).

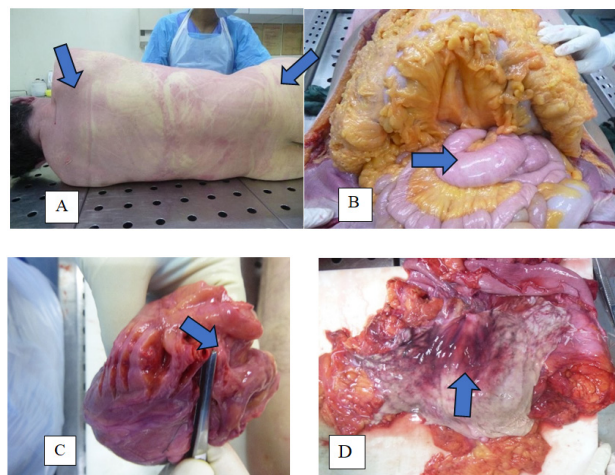


Fig. 2 A Cherry pink hypostasis at the back of the body (blue arrows). B Pink hue was also observed in the internal organs, including the small intestine (blue arrow). C The anterior descending coronary artery shows an approximately 50% luminal occlusion by atheroma (blue arrow). D The cut-section of the body of the stomach shows haemorrhagic gastric mucosa (blue arrow).

Detailed examination of the thoracic and abdominal organs revealed no significant natural disease pathology which could have directly caused death at that point in time. Cut surfaces of the heart showed an approximately 50% luminal occlusion of the left anterior descending coronary artery by atherosclerotic plaques (Fig. 2C). There were no acute ischaemic changes or fibrosis of the myocardium seen macroscopically. The abdominopelvic organs were generally unremarkable, except for the stomach mucosa, which showed haemorrhagic changes (Fig. 2D).

Blood was collected for toxicological analysis prior to the body dissection, to confirm the presence of carbon monoxide and other substances, including Zolpidem. The toxicology report was positive for Zolpidem with a level of 0.04 micrograms per millilitre and carbon monoxide could not be analysed because of blood decomposition changes.

Histopathological findings

Representative tissue samples from the brain, heart, lungs, liver, spleens and kidneys were obtained for microscopic examination. Routine haematoxylin and eosin (H&E) staining showed significant pathological changes were discovered in the lungs and heart (Fig 3). Sections from the lungs revealed soot particles within the airways and destruction of the interstitium and alveoli associated with a pulmonary oedema (Fig. 3A & B). The heart exhibited patchy areas of dense collagen deposition, in keeping with ischaemic heart disease (Fig. 3C). The liver showed macro and microvesicular steatosis in keeping with fatty liver. Centrilobular sinusoidal congestion and dilatation was also observed, in keeping with acute ischaemic liver injury which was secondary to carbon monoxide poisoning (Fig. 3D). Microscopic examination of the brain, spleen and kidneys showed non-specific changes such as vascular congestion.

Fig. 4 A,B,C- Histopathological features of pulmonary oedema (blue star) in the lungs, soot within airways(blue arrow) and destruction of alveoli(blue cross). D - Dense collagen deposition in the myocardium of the left ventricle (blue cross), in keeping with ischaemic heart disease. E- Histopathological features of macro and microvesicular and steatosis (blue star), indicative of fatty liver, accompanied by centrilobular sinusoidal congestion and dilatation indicative of acute liver

ischaemia (blue arrow).

In view of the circumstantial evidence and autopsy findings, the cause of death was concluded to be carbon monoxide poisoning. Incidental findings included microscopic myocardial fibrosis and fatty liver. Zolpidem was detected in the toxicological analysis, confirming that he had taken the medication prior to burning the charcoal. The myocardial fibrosis resulted from a previous cardiac ischaemic event due to luminal occlusion of the coronary artery.

Discussion

Several factors have been identified that may increase the risk of suicide, including psychiatric disorders, medical conditions such as chronic illnesses, and social factors such as relationship issues and financial difficulties. Interestingly, certain medications have also been associated with an increased risk of suicide as a side effect. These include psychiatric medications such as antipsychotics, neurological medications such as antiepileptics, opioid painkillers and hormonal contraceptives. Additionally, Zolpidem has also been linked to suicidal ideation as a potential side effect⁴. In this case, the deceased was experiencing financial difficulties due to his unstable business. Toxicological analysis revealed the presence of Zolpidem at a concentration of 0.04 micrograms per millilitre, indicating that the medication had been taken prior to the incident. As the lethal level of Zolpidem is approximately 2 micrograms per millilitre, the detected amount was not sufficient to cause death on its own.⁷ While the possibility of long-term use cannot be excluded, the presence of fatty liver is a pointer towards the long-term use of Zolpidem. We hypothesize that a combination of financial difficulties and long-term Zopim use contributed to his decision to take his own life.

Charcoal burning is the third most common method of suicide in Malaysia, after hanging and fall from height, according to a 10-year study Jamaldeen M.I., Hafiz W.M.et al.⁸ Charcoal burning releases CO into the environment, which poses a significant risk of poisoning. Carbon monoxide has a 200–300 times greater affinity for haemoglobin than oxygen, forming carboxyhaemoglobin. When the saturation of carboxyhaemoglobin exceeds 30%, the characteristic cherry-pink colour becomes

evident in the body. In healthy adults under 60 years of age, death typically occurs when the blood carboxyhaemoglobin saturation exceeds 50-60%. However, individuals with pre-existing conditions, such as coronary artery disease or respiratory insufficiency, may succumb to fatal effects at lower CO concentrations due to impaired oxygen delivery and increased vulnerability to hypoxia⁹. In this case, the cherry-pink appearance indicated the presence of at least 30% carboxyhaemoglobin.

Zolpidem is known to cause side effects such as respiratory depression. In this case, the deceased also had 50% coronary artery occlusion. The combination of these factors may have worsened the hypoxic state induced by carbon monoxide exposure. The compromised coronary circulation could have further exacerbated the effects of carbon monoxide poisoning, potentially contributing to an earlier onset of fatality.

Conclusion

Autopsy and scene findings may support a diagnosis of carbon monoxide poisoning especially if laboratory analysis is delayed or hindered by decomposition changes of the postmortem specimens. In this case, pre-existing ischaemic heart disease and fatty liver could have lowered the threshold for fatality. Zolpidem, detected at sublethal levels, may have contributed through respiratory depression. As its long-term use is also associated with suicidal ideation, this case highlights the need for cautious prescribing of Zolpidem and improved public awareness of mental health support services.

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Ethical Approval: We seek for waiver of ethical review and approval since the data were not directly indicative of the individual subject, observatory in nature and the research involved no risk to the deceased subject.

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