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Volatile Substance Abuse still of concern

L Nitin Seetohul^{1*}, Giorgia De Paoli, Peter D Maskell²

Centre for Forensic and Legal Medicine, University of Dundee, Dundee,

DD1 4HN. Scotland, UK.

¹Current address – School of Science and Technology, Nottingham Trent University, Nottingham. U.K.

²Current address - Department of Chemical and Forensic Sciences, University of Huddersfield, Huddersfield U.K.

*Author to whom correspondence should be addressed, email nitin.seetohul@ntu.ac.uk

With all of the recent publicity over novel psychoactive substances it is easy to forget that other easily available intoxicants can be found.

Dimethyl ether (DME), also known as methylether, is an extremely flammable volatile organic compound with chemical structure CH_3OCH_3 . This ether is a by-product of methanol production and is a colourless gas or liquid with ether like odour. Dimethyl ether has been used as a fuel, an aerosol propellant, a refrigerant and in 'freeze' sprays. Dimethyl ether is an asphyxiant, but in liquid form it can act as a refrigerant. When inhaled, it is recognised to produce symptoms of euphoria, agitation, headache, and slurred speech (1,2).

Very little is known about the acute or chronic effects of dimethyl ether in humans. The UK short-term exposure limit is 500 ppm and the long-term exposure limit is 400 ppm (3).

Recently the presence of the volatile substance dimethyl ether was identified in brain tissue of a 38 year old man with history of anxiety, depression and post-traumatic stress disorder. Due to the lipid solubility of dimethylether they can easily cross lipid membranes and distribute to well perfused organs such as the brain (4). The body was in a moderate state of decomposition surrounded with a number of aerosol cans (Muscle "freeze" spray). Dimethyl ether was found in combination with ethanol in brain and other prescribed drugs (Gabapentin & Trazadone) in skeletal muscle. Due to the extensive putrefaction seen in the specimen, some if not all the ethanol detected could be a product of this process.

Dimethyl ether, as a refrigerant and if sprayed into the mouth/throat, could stimulate the branch of the vagus nerve at the back of the throat. Stimulation of the vagus nerve causes the heart to slow. Over stimulation could cause the heart to stop. Myocardial ischemia caused by coronary vasospasm has also been hypothesised as a mechanism of death (4). As an asphyxiant its effects would include depression of the breathing and conscious levels.

Taking into consideration of the history, circumstances surrounding the death and the toxicological findings, death was attributed to volatile substance abuse. The medical community should be aware of the availability of volatile abuse of Muscle “freeze” spray containing dimethyl within the UK.

References

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