Death of a HIV-infected Homosexual from Nitrite Inhalants (Poppers)

M Stefanidou[1], I Lefkidou[2], C Lefkidis[2], C Spiliopoulou[1], C Maravelias[1]

INTRODUCTION

Drugs such as nitrites, methamphetamine, phosphodiesterase type 5 (PDE-5) inhibitors, ketamine, gamma hydroxybutyrate (GHB) and others have long been used as precursors to sex or during sex by some individuals. Nitrites in the form of amyl nitrite have also a long history of use in the treatment of angina pectoris and as antidotes in cyanide poisoning (1, 2). These amyl nitrites and several other alkyl nitrites are present in the over-the-counter products, such as air fresheners or video head cleaners and have been used as inhalants since 1960 to facilitate and enhance sexual intercourse, particularly by homosexual or bisexual men (3, 4). Since then, these products have been part of the club culture from the 1970s disco scene to the 1980s rave scenes and from the 1990s to the years following 2000 and simultaneously they have been linked to uncontrolled altered sexual behaviours among homosexuals (4, 5). The alkyl nitrites (*eg*, amyl, butyl, isopropyl) are colourless or yellow liquids at room temperature and are highly volatile. They have been nicknamed "poppers" because of the sound made when glass capsules containing amyl nitrite are crushed (3, 6).

Alkyl nitrites are peripheral vasodilators and they can cause nausea, ataxia, headache, sedation, syncope, hypotension, cutaneous flushing, pulmonary irritation, methaemoglobinaemia and death when inhaled in excess (7, 8). They are commonly abused primarily by homosexual men in order to facilitate and enhance sexual intercourse and/or produce euphoria (3, 4). These properties may explain the great prevalence of abuse of nitrite inhalants among members of the male homosexual community in the early 1980s (1, 9) while heterosexuals utilize nitrites primarily to facilitate sexual intercourse and/or produce euphoria (10).

Concurrent use of nitrites may have complex and often harmful physiological or cognitive side effects. By decreasing inhibitions, nitrite use may result in unprotected sexual behaviour among gay men and enhance the likelihood of rapid partner change and unprotected anal intercourse (2, 11–13). In addition, the vasodilatory effects of poppers may facilitate the entry of HIV through the anal mucosa or other mucosae into the blood stream (14).

Keywords: HIV, homosexual, nitrites, poppers

From: [1]Department of Forensic Medicine and Toxicology, Medical School, University of Athens, Greece and [2]Department of Forensic Medicine, Ministry of Justice, Athens, Greece.

Correspondence: Dr M Stefanidou, Department of Forensic Medicine and Toxicology, Medical School. E-mail: mstefan@med.uoa.gr

During the last decades, scientific interest in nitrites has been increased regarding the drugs role in the gay community, since studies have associated use of nitrite inhalants among homosexual men with prevalent HIV infection, with sexual behaviours that entail risk of acquiring HIV infection and with increased risk of HIV seroconversion (4, 5). This seroconversion is due to the immunomodulation caused by nitrites (15). Ostrow *et al* (5) found these associations in the Multicenter AIDS Cohort Study while a similar correlation was not found for other substances of abuse, including alcohol (4, 16). This immunomodulation caused by nitrites was first advanced by Goedert *et al* (17). According to Haverkos and Drotman (14), nitrites transiently impair immune function in both animals and human (14, 18, 19).

Nitrite inhalant use is associated with decreased lymphocyte counts and natural killer cell activity in laboratory studies and remains a candidate "cofactor" in the pathogenesis of HIV infection and certain AIDS-related syndromes such as Kaposi sarcoma (20).

Case Report

A 51-year old male medical doctor died when his car crashed into a tree in the early one morning. He was transferred to the hospital and the nursing personnel found in his pocket two glass vials, the first with the indication "TRIP" and the second with the indication "RUSH". The vials contained 5 ml of liquid each. The toxicological analysis revealed that the "TRIP" contained propylnitrite and the "RUSH" contained butylnitrite. The toxicological analysis of the blood of the deceased man was negative for alcohol, drugs of abuse and other drugs including PDE-5 inhibitors. The toxicological analysis of post-mortem blood was negative for nitrites, but it was positive for methaemoglobinaemia, since the measured methaemoglobin level was 22%. The detection of nitrites is usually difficult since nitrite is unstable in whole blood and in post-mortem blood, with the exception of frozen plasma where it is stable for up to one year (21) while methaemoglobin is normally cleared from the blood with a half-life of one hour after use (22). According to the information given to us by the Police authorities, the deceased was a known homosexual and HIV-infected individual.

The head injuries due to traffic accident, according to the pathologist who performed the autopsy, were not considered severe enough to cause death. The histological examination of the heart which weighed 620 g revealed: 1) acute myocardial infarction located above a smaller previous one, both cited on the lower posterior wall of the left ventricle 2) ischaemic hypertrophic cardiomyopathy 3) severe atheromatous lesions of the coronary vessels type IV, Va and Vb, leading to the stenosis of the lumen of the right and the

anterior descending coronary arteries, by 85% and 95% respectively 4) pulmonary oedema and pulmonary congestion were present in the lungs 5) the kidneys revealed congestion.

Comment

According to the laboratory and the autopsy findings as well as the information given by the deceased's acquaintance, it was concluded, that the deceased had used alkyl nitrites 1–2 hours earlier, had the myocardial infarction while driving and crashed into the tree. It cannot be speculated if he could have survived this infarction, if he were not a chronic nitrite inhaler or a HIV-infected individual. A similar case of poppers use is reported in the literature and concerns the death of a 69-year old man with severe coronary artery disease who inhaled isobutyl nitrite for 20 minutes and collapsed due to hypoxia secondary to methaemoglobinaemia; the methaemoglobin level in the post-mortem blood measured three weeks after autopsy, was found to be 23% (23). Other cases reported in the literature concerned symptomatic methaemoglobinaemia due to nitrite inhalation. Methaemoglobinaemia is a potential toxic effect of aliphatic nitrites which are increasingly abused by male homosexuals and drug addicts because of marked vasodilating properties. A deficiency in NADH-dependent haemoglobin reductase in some patients has been noted (24).

It is the intention of the present report to remind clinicians, community leaders as well as gay men, of the dangers and health problems associated with nitrite abuse such as uncontrolled sexual behaviour, immunomodulatory effects predisposing to AIDS, risk of acquiring HIV infection or/and HIV seroconversion and the fact that nitrite inhalants is considered as one possible factor for the pathogenesis of AIDS-related Kaposi's sarcoma.

Epidemiological studies have shown that homosexuals, who use poppers, during sexual encounters are much more likely than non-users to have greater numbers of casual partners and to have anal unprotected intercourse with these partners. Contemporary use of nitrite inhalants among young homosexual men is also a strong indicator of this practice.

A knowledge survey is needed to determine whether homosexuals are aware of HIV-related risks associated with the use of poppers. Furthermore, efforts to reduce the use of nitrite inhalants during sexual encounters should be considered a high-priority in HIV prevention strategy for homosexuals. Therefore, clinicians, community leaders, as well as, the gay press should strongly discourage the use of nitrite inhalants and inform the public of all the severe health consequences associated with such a use particularly when used simultaneously with PDE-5 inhibitors.

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