

K21 The Effects of Kambo: The First Case of Sudden Death in Forensic Literature

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After attending this presentation, attendees will be able to describe the effects of Kambo as a concurrent cause of death in users with heart disease.

This presentation will impact the forensic science community by explaining Kambo's biological effects and the need to control its sale.

Kambo is a substance obtained from the skin secretions of a frog, *Phyllomedusa bicolor*. The secretions are used during a purification ritual common in some regions of South America. After the skin is burnt, the secretions are applied, causing a type of poisoning in a process not yet fully understood. No fatalities associated have yet been reported. In the case reported, the biological effects of Kambo with the potential to cause death were analyzed.

A 42-year-old man was found dead in his house. The external examination showed recent burns on the left arm. A wooden stick, approximately 10cm long and burnt on one end, was found near the body. A plastic box labeled "Kambo Sticks" was also found. From his medical history, it emerged that the man was a chronic consumer of this substance. There was no history of drug use nor a family history of sudden premature death or ischemic heart disease.

A toxicology analysis was performed on biological fluids for alcohol, prescription medication, and illicit drugs. A toxicological study was also conducted on the Kambo sticks and on biological fluids (blood and vitreous humor). The analysis consisted of reverse phase High-Performance Liquid Chromatography (HPLC) and mass spectrometry with TripleTOF® 5600+ System. Internal analytical standards were used for the research of dermorphin, deltorphin A, phyllocaerulein, phyllokinin, sauvagine.

The heart exhibited left ventricular concentric hypertrophy. There were also apparent petechiae on the subpleural area and a subconjunctival hemorrhage. Histological examination revealed moderate coronary artery disease with a reduction of approximately 65% of the left coronary branch by the atheroma. The brain displayed intraparenchymal microhemorrhages. The lungs had subpleural petechiae and bullous emphysema, with fibrotic thickening of the septal interstitium and sporadic micro-granulomas. The myocardium exhibited fragmented myofibrils and areas with marked intermyofibrillar connective tissue.

The toxicological screening was negative for cannabinoids, opiates, cocaine metabolites, benzodiazepines, and ethanol. The investigations performed on the sticks found in the house demonstrated the presence of deltorphin A, phyllocaerulein, and phyllokinin; however, regarding biological fluids, deltorphin A was isolated exclusively in blood.

Kambo is comprised of a peptide mix. The peptides contain opioids including dermorphin and deltorphins, vasoactive molecules including phyllocaerulein, phyllomedusin, phyllokinin, sauvagine, and antimicrobials including dermaseptins. The peptides affect the body both at a central and peripheral level. The effects of each peptide are not yet fully understood. In the case reported, the man died suddenly after the substance was applied. In this case, as noted by the clinical data reported by the family doctor, the young man didn't appear to have any diseases or symptoms, and didn't take any medicine for treatment or other drugs intravenously. From the testimony of his mother, death happened approximately 30 minutes after the application of the drug. The autopsy revealed a left ventricular hypertrophy. By analyzing the action of these peptides on the body, it is possible to assume that the chronic consumption of some of the cardioactive peptides could lead to the development of left ventricular hypertrophy. Coronary artery disease was also found, most likely associated with the man's lifestyle (smoker and overweight). Certainly, the more likely effect would be hypotension. Death might therefore result from hypoperfusion of the heart which, in this case, could well be exacerbated by the increased left ventricular mass and moderate coronary artery disease. In a heart exhibiting moderate coronary artery disease and left ventricular hypertrophy, this generated an acute cardiac ischemia and consequent ventricular fibrillation. The following pressure peak generated was demonstrated by diffuse cerebral microhemorrhages, subpleural petechiae, and subconjunctival hemorrhage. The positive results of the toxicological investigation made it possible to state that the substance could be one of the concurrent causes of death. It is also important to consider that this substance can easily be ordered and obtained from many websites without any controls and/or prescriptions.

Forensic Science, Kambo, Sudden Death