

Case Report

A Case Report on the Toxicological Evaluation of Pyridaben from a Human Cadaver

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Introduction

Pesticide toxicity accounts for profuse morbidity and mortality globally for most developing countries due to deliberate or accidental inoculation [1]. The most prevalent way of suicide worldwide, according to the World Health Organisation (WHO) and the Food and Agriculture Organisation of the United Nations (FAO), is pesticide poisoning in low- and middle-income nations [2]. These are extensively employed in the primary sector mainly agriculture irrespective of the need to consider the reciprocation of their unmonitored and indiscriminate usage. The government constituted a statutory act namely the Insecticides Act of 1968, under the Department of Agriculture and Co-operation of the Ministry of Agriculture, Central Insecticides Board and Registration Committee (CIBRC), and under the Food Safety and Standards Act (2006), the Food Safety and Standards Authority of India (FSSAI) was established with the same objective to be fulfilled. Despite this, the state fails to regulate pesticide-based practices, and the leverage is taken by the people to commit offenses including self-harm [3].

Pesticides are potentially hazardous to humans and ecosystems [4]. The effects of exposure to pesticides and their transformation products on agricultural commodities consumers and nontarget organisms have been a matter of concern in recent years. In the classification of pesticides by hazard the

Abstract

Suicidal poisoning with pesticides in humans is common in India. Despite the interdiction or regulation of several pesticides, there are reported considerable poisoning cases in India. Pyridaben is a potentially fatal insecticide with extreme neurotoxicity in humans. Pyridaben toxicity reports in humans are uncommon. Here we describe a case of acute poisoning with Pyridaben in a minor girl who presented with severe nausea, vomiting, altered consciousness, body weakness, abdomen pain, and congestion of visceral organs. Soon after the poisoning, the patient was treated with life-saving mechanical ventilation. Forensic examination of the viscera of a minor victim enlightened that the death was assignable to *Pyridaben* intoxication. GC-MS analysis of viscera showed significant results in concern to the identification of *Pyridaben*. The present case study emphasized the misuse of readily accessible pesticides and identified a new pesticide that can exert a deleterious impact on human health deliberately (suicide) and unintentionally (accidental) exposure. The same needs to be communicated to the scientific community to explore this lethal pesticide for its all-possible detrimental impacts consequently gathering scientific evidence in this regard will abet to regulate it by legislative.

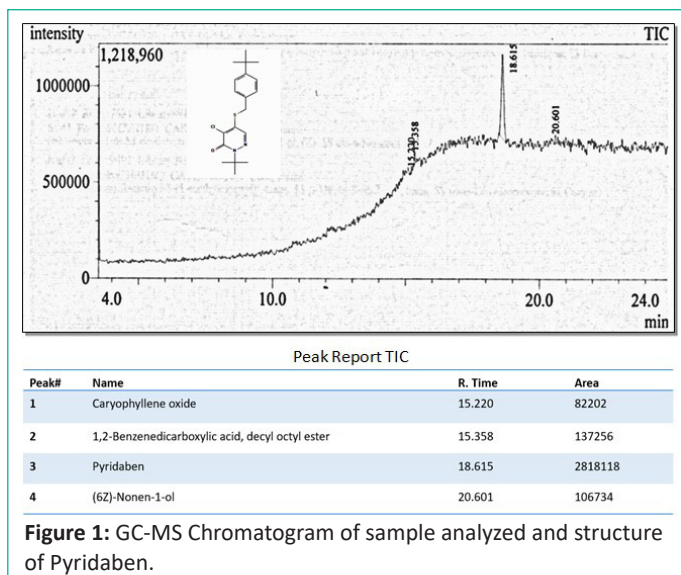
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World Health Organization, pyridaben is classified as a moderately hazardous (Class II) pesticide [5].

Pesticides were sorted into 5 groups: herbicides, insecticides, fungicides, other pesticides, and combined pesticides. Pyridaben is an acaricide (insecticide) frequently employed worldwide to eradicate thrips, aphids, white flies, and phytophagous mites. It is extremely poisonous to non-target creatures like fish, bees, and predatory mites. Therefore, it is important to be concerned about the presence and removal of pyridaben in food and the environment. [6] A forensic examination of the human visceral sample was performed in the current case study to determine the prevalence of poisoning among the deceased who presented to the emergency room with acute poisoning.

Case Report

A minor female victim of 17 years old was admitted to the emergency department of the hospital in an unconscious state after an illness with severe nausea, vomiting, altered consciousness, body weakness, abdomen pain, and congestion of visceral organs. Later, the victim was declared dead by the doctor. The investigation found no foul play behind the death of the deceased, indicating that the victim had self-inoculated the toxic substance. Blood and viscera samples were preserved for foren-



sic toxicological analysis after the post-mortem examination to decipher the cause of death.

Post-Mortem Examination Exhibits the Following Characteristics

General examination: Rigor mortis present all over the body, post-mortem staining present on the backside of the body, both eyes closed with congested conjunctivae, mouth and tongue closed, nail cyanosed, and bleeding from nostrils.

External examination: No external injury was present over the body.

Internal examination: Peritoneal cavity found with 500 ml of yellow serous fluid present and 50 ml of brownish fluid in the stomach. The Mucosa of the tracheal lumen was congested and the lumen of the trachea contains blackish and froth which was traced up to the bifurcation of the trachea. The heart and both lungs were found congested and edematous. The small intestine, large intestine, liver, gall bladder, spleen, biliary passage, kidney, renal pelvis, and ureter were found congested.

Materials and Methods

Toxicological viscera samples containing the stomach, pieces of the small intestine, liver, kidney, and blood sample were received from the hospital after the postmortem examination of the deceased and were sent to the Chemistry Division, Forensic Science Laboratory for the examination. All the chemicals and reagents were used of analytical grade for the analysis [7]. Forensic examination of viscera rendered chemical test method for the detection of unknown substance using solvent system hexane: chloroform: acetic acid (9:5:0.5) with silver nitrate as spraying reagent. The unknown sample produced positive results in early TLC testing or screening and was employed for the GC-MS analysis. Analyses were performed on GC-MS-QP2020NX (SHIMADZU), JAPAN coupled with a mass spectrometer (SHIMADZU Technologies) was used for compound analysis. The identification of each peak in the total ion flow chromatogram was automatically retrieved from the National Institute of Standards and Technology (NIST) MS search 2.4 as the standard mass spectrometry database and verified with standard mass spectrometry. Some components were confirmed with the retention value of a standard sample.

Results and Discussion

The TLC for the sample gave positive results in comparison

to the working standard. The confirmatory test was performed through GC-MS analysis. As a result, the spectral quality of each chromatographic peak in the TIC's mass spectrum was received. Each TIC peak's mass spectra were properly examined and searched using electronic commercial or approved in-house spectral libraries. Five compounds were identified in the analyzed viscera samples by using GC-MS analysis shown in Figure 1. The GC-MS examination of the sample in the Forensic Science Laboratory concluded that the exhibit results revealed the highest specific surface area for the compound Pyridaben at the retention time (TR) of 18.615 min (Figure 1). Identification of components was achieved based on their retention indices and interpretation of the mass spectrum was conducted using the database. In a recent study, a 15-year-old girl who had consumed a hazardous dose of Avermectin Pyridaben orally presented with coma, ataxia, and other serious clinical signs. Electromyography (EMG), Nerve Conduction Study (NCS), and brain Magnetic Resonance Imaging (MRI) later revealed toxic encephalopathy and peripheral nerve damage [8].

Conclusion

In India, extremely dangerous pesticides are still in use, and pesticide suicide is still a significant public health issue. Forensic examination of the sample determined that the death could be caused due to identified toxic compound Pyridaben. Through this case study in forensic science, the laboratory extricated that the synthetic insecticide Pyridaben is very rare and potent chemical to cause mortality. Hence, there arises a need for the scientific community to conduct further research studies to delineate other facts about its lethality and impacts on human health. This is essential to emphasize the regulation by legislative policies. In addition to this, public cognizance regarding its mortal impact must be disseminated as this insect-repellant product can also be availed unintentionally for household toils and may contribute to accidental poisoning cases apart from suicidal cases.

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