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FLUBENDIAMIDE POISONING: A CASE REPORT

KEY WORDS: Flubendiamide Poisoning, Deliberate Self-harm, Pesticide Ingestion, Diamide Insecticide, Mucosal Ulceration

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ABSTRACT

Introduction: Deliberate self-harm (DSH) by ingesting pesticides is a prevalent issue, particularly in rural areas of developing countries. Flubendiamide, a diamide insecticide, is considered less toxic than other pesticides but can still cause significant clinical symptoms when ingested in large quantities. This report examines a case of deliberate Flubendiamide ingestion and the subsequent medical management. **Case Presentation:** A 35-year-old woman presented with a history of deliberate ingestion of Flubendiamide 39.35%, approximately 5-10 ml, following a stressful domestic event. She initially experienced symptoms of loose stools, vomiting, and epigastric pain. After receiving gastric lavage and conservative treatment at a local hospital, she was transferred to our facility for further observation. On admission, she was conscious and had stable vital signs. General and systemic examinations were unremarkable, except for an ulcer in the hard palate. Baseline laboratory investigations were normal except for iron deficiency anemia. She was managed with supportive care, and her symptoms resolved during her hospital stay. **Discussion:** Flubendiamide targets insect ryanodine receptors but may also affect human calcium channels. Although it is marketed as having low mammalian toxicity, the presence of mucosal ulceration and gastrointestinal symptoms in this case suggests localized toxicity, possibly linked to the phthalic acid component in the insecticide. The patient's timely intervention and stable condition reflect the importance of early medical care in pesticide poisoning cases. **Conclusion:** Despite its low toxicity, Flubendiamide can cause significant symptoms in humans, particularly mucosal damage. Early decontamination and supportive care are critical in managing such cases.

INTRODUCTION

Deliberate self-harm (DSH) is a growing public health concern worldwide, particularly in developing countries where access to harmful substances such as pesticides is widespread. DSH is defined as the intentional act of causing harm to oneself without suicidal intent, though in many cases, the act can be fatal, either intentionally or accidentally. It encompasses a range of behaviors, including the ingestion of toxic substances, cutting, burning, and other methods. (1) Pesticide ingestion remains one of the most common means of DSH, especially in rural and agricultural areas where such substances are easily accessible. This method is associated with high morbidity and mortality, as the chemicals involved are often toxic and require immediate medical intervention. (2) (3)

Among the various pesticides available, Flubendiamide is a newer class of insecticides, classified as a Group 28 insecticide by the Insecticide Resistance Action Committee (IRAC). It acts by targeting the ryanodine receptors in insects, leading to paralysis and death. It is commonly used in agriculture to control a wide range of pests, particularly in crops such as cotton, rice, and vegetables. (4) Though marketed as having low toxicity to mammals, Flubendiamide can still pose serious health risks when ingested in significant quantities. The exact mechanism of its toxicity in humans is not fully understood, but its effects are generally believed to be less severe compared to other highly toxic pesticides such as organophosphates. However, ingestion can lead to gastrointestinal disturbances, as well as other systemic effects depending on the amount consumed and the delay in medical intervention. (5)

The toxicity of pesticides, including Flubendiamide, varies widely based on multiple factors such as dosage, route of exposure, and the individual's health status. While accidental exposure in agricultural workers is not uncommon, cases of deliberate ingestion are increasing, often in response to stressful life events. (6) The clinical manifestations of Flubendiamide poisoning are not as well-documented as other pesticides, partly because it is relatively new to the market. However, available reports suggest that patients who ingest significant quantities may present with symptoms such as vomiting, abdominal pain, diarrhea, and, in rare cases, systemic toxicity that can affect the cardiovascular and central nervous systems (7).

Management of pesticide poisoning, including Flubendiamide ingestion, largely relies on supportive care, as there are no specific antidotes available for most pesticides. Initial treatment includes decontamination, such as gastric lavage, followed by symptomatic management. (8) Depending on the severity of the poisoning, patients may require hospitalization for observation and monitoring of vital signs and organ functions. The prognosis in cases of Flubendiamide poisoning is generally good if the patient receives timely medical intervention, though the outcome can vary depending on the amount ingested and the patient's overall health condition. (9)

Given the increasing prevalence of pesticide-related DSH in rural areas, there is an urgent need for further research and case documentation to better understand the clinical presentation and optimal management strategies for Flubendiamide poisoning. (10) (11) Although Flubendiamide is considered less toxic to humans than other pesticides, the lack of comprehensive data on its effects in cases of deliberate ingestion poses challenges for healthcare providers. (12)

This case report contributes valuable insight into the clinical management of Flubendiamide poisoning and highlights the importance of mental health support in preventing DSH, particularly in regions where access to toxic substances is easy. By documenting cases such as this one, we aim to improve awareness and understanding of the potential risks associated with newer pesticides and emphasize the need for preventive strategies and better access to mental health care.

Case Presentation

A 35-year-old female, Mrs. Sumithra S., was brought to the

emergency department with a history of deliberate ingestion of Flubendiamide 39.35%, approximately 5-10 ml, following a stressful domestic event. The patient consumed the pesticide around 7:00 PM and soon after experienced one episode of loose stools, epigastric pain, and vomiting. She was initially taken to a local hospital where gastric lavage was performed, and she received conservative treatment. While there, she had two additional episodes of loose stools.

Upon her transfer to SRMC for further management, she was admitted to the Intensive Care Unit (ICU) for observation. At the time of admission, the patient was conscious and oriented with stable vitals. Her pulse rate was 56 beats per minute, respiratory rate was 20 breaths per minute, and blood pressure was 110/70 mmHg. General examination revealed no pallor, icterus, cyanosis, clubbing, lymphadenopathy, or pedal edema.

Systemic examination was unremarkable. Cardiovascular examination revealed normal heart sounds (S1, S2), and respiratory examination showed bilateral air entry without any abnormal breath sounds. Neurologically, her Glasgow Coma Scale (GCS) score was 15/15, and pupils were reactive to light bilaterally. The power was 5/5 in all limbs, and reflexes were normal. Abdominal examination revealed a soft abdomen with audible bowel sounds, though there was an ulcer observed in the hard palate.

Baseline investigations showed hemoglobin of 10.3 g/dl, suggestive of iron deficiency anemia. Other laboratory values included a total white blood cell count of 7550, platelet count of 141,000, prothrombin time index (PTI) of 13, and INR of 1.1. Renal function tests revealed a BUN of 5 mg/dl and creatinine of 0.5 mg/dl, while liver function tests were within normal limits. An ECG showed a normal sinus rhythm, and a chest X-ray revealed clear lung fields.

Throughout her ICU stay, the patient remained stable. She did not experience further abdominal pain, vomiting, or loose stools. Oral feeds were well-tolerated, and she was subsequently shifted to the ward. On the day of discharge, she was symptomatically better and received discharge advice, which included oral medications such as Ranitidine and a multivitamin supplement, along with instructions to follow up in the outpatient department. The patient's iron deficiency anemia was also addressed, and she was prescribed iron supplements.

DISCUSSION

Flubendiamide is classified as a Group 28 pesticide, acting on the ryanodine receptors of insects to disrupt calcium ion release, leading to paralysis and death of the target pest. Though it is considered to have low mammalian toxicity, ingestion in large quantities can still lead to gastrointestinal disturbances and other systemic symptoms, as seen in this case. The patient's clinical presentation of loose stools, vomiting, and epigastric pain, although non-specific, is consistent with the expected toxic effects of pesticide ingestion.

Management of Flubendiamide poisoning is primarily supportive. There is no specific antidote for this pesticide, making early gastric decontamination (e.g., gastric lavage) and symptomatic treatment the cornerstone of care. In this case, the patient's prompt treatment at an outside hospital and transfer to a tertiary care center likely contributed to her positive outcome.

In this case report, we highlight the management and clinical outcomes of a 35-year-old woman who ingested Flubendiamide 39.35%, a relatively new diamide insecticide used in agriculture. Her presentation with loose stools, epigastric pain, and vomiting was consistent with typical gastrointestinal symptoms seen in pesticide ingestion, but fortunately, her overall clinical course was stable. When comparing this case with other reported instances of pesticide poisoning, such as those involving more toxic compounds like organophosphates or paraquat, Flubendiamide appears to present with a milder toxicity profile. This difference is important, as Flubendiamide has been touted for its low acute toxicity in mammals, but our case, along with others, still illustrates the need for cautious handling and timely medical intervention following exposure.

In the study by Bhowmick et al. (2019), pesticides were the most common method of poisoning in their cohort of 492 patients. A significant proportion of these cases involved rural populations, and the male predominance was notable, reflecting gender-related occupational exposure in agriculture. By comparison, in our case, the patient was a 35-year-old woman, which fits the demographic for impulsive self-harm behavior in domestic settings, as opposed to occupational exposure. Flubendiamide, the ingested substance, is less commonly reported in the literature compared to other pesticides like paraquat, which was associated with a high mortality rate in Bhowmick's study. However, this case highlights that even "low-toxicity" insecticides can lead to significant clinical symptoms, underscoring the need for ongoing awareness and research into these newer compounds. (13)

The mechanism of action of Flubendiamide involves binding to ryanodine receptors, leading to disruption of calcium homeostasis in insects, similar to chlorantraniliprole, another diamide insecticide, as explored by Magyar et al. (2019). These insecticides target the sarcoplasmic reticulum, causing excessive calcium release, which in turn leads to paralysis in pests. While this mode of action is specific to insects, concerns have been raised about potential effects on mammalian cells. Our patient did not exhibit any signs of significant neuromuscular or cardiovascular dysfunction, which suggests that the systemic effects of Flubendiamide ingestion in humans may be limited, especially with prompt medical care. However, the presence of an ulcer in the patient's hard palate suggests some degree of local toxicity, potentially due to the chemical's phthalic acid component, which can cause mucosal irritation and ulceration upon contact. (14)

Phthalic acid, a degradation product found in many synthetic chemicals, including certain pesticides, can contribute to gastrointestinal and mucosal irritation. While not a primary component of Flubendiamide, the presence of phthalic acid derivatives in the compound may account for some of the localized mucosal damage observed in our patient. This aspect warrants further investigation, as phthalic acid exposure has been associated with complications such as contact dermatitis, mucosal ulceration, and, in chronic cases, endocrine disruption.

The study by Li et al. (2023) further emphasized the need for ongoing research into the persistence of pesticide residues, including those from diamide insecticides, in food products. While our case involves acute self-harm via ingestion, it raises questions about the potential long-term effects of low-level exposure to Flubendiamide residues through diet. (15) Chronic exposure to pesticide residues has been linked to alterations in the gut microbiome and potential endocrine disruption, as discussed by Waring et al. (2023). Although the patient in our case did not present with long-term exposure effects, this remains a significant area of concern, particularly in regions where these chemicals are heavily used in agriculture. (16)

In summary, while Flubendiamide poisoning generally presents with milder symptoms compared to other agricultural chemicals, it is not without risk. Our patient's clinical course was favorable, likely due to early gastric

lavage and supportive care. This case underscores the importance of timely intervention in pesticide poisoning and highlights the potential mucosal complications associated with phthalic acid, a component of many insecticides. It also calls attention to the broader public health implications of pesticide use, particularly the need for stricter regulations and more comprehensive research into the long-term effects of even low-toxicity compounds on human health.

CONCLUSION

This case illustrates that despite the low toxicity of Flubendiamide, ingestion in sufficient quantities can lead to clinical symptoms requiring medical intervention. Early gastric decontamination and supportive care are crucial in managing pesticide poisoning. Public awareness about the dangers of pesticide ingestion and the importance of mental health support in preventing deliberate self-harm is critical, especially in agricultural regions where such chemicals are readily available.

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Conflict of Interest:
The authors declare no conflicts of interest related to the publication of this case report.

Informed Consent:
Informed consent was obtained from the patient for the publication of this case report and any accompanying images.

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