Case Report

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Acute oral poisoning due to pretilachlor herbicide – a rare case report from Nepal

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Introduction: Acute oral intoxication of pretilachlor, a synthetic chloroacetanilide herbicide, can present similar clinical manifestations of organophosphorus toxicity in humans.

Case presentation: A 15-year-old male was admitted after suicidal ingestion of pretilachlor poison, with decreased consciousness and blood-mixed vomiting.

Discussion: Pretilachlor is a colorless and odorless liquid that can cause neurotoxicity and carcinogenicity due to its prolonged exposure. The effects of acute oral exposure are mild and may differ from chronic exposure. Individuals exposed to chloroacetanilides may not show symptoms or experience vomiting and neurological issues. Clinical manifestations such as vomiting, excessive lacrimation, bowel and bladder incontinence, bradycardia, and hypotension can be observed in both organophosphate poisoning and pretilachlor poisoning, making accurate diagnosis challenging, particularly in resource-limited settings like ours. There is no specific antidote for pretilachlor poisoning. Treatment focuses on symptomatic care and monitoring the patient's hemodynamics as per standard protocol.

Conclusion: This case underscores the need for prompt stabilization, vigilant monitoring, and supportive care to ensure timely recovery in pretilachlor poisoning cases despite similarities with organophosphate poisoning. It emphasizes the importance of educating and raising awareness among physicians about potential mimickers like organophosphates.

Keywords: poisoning, pretilachlor, vomiting

Introduction

Pretilachlor is a chloroacetanilide herbicide derived from natural compounds, commonly used in South Asian countries for annual grasses and broad-leaved weeds including Echinochloa Beauvois, *Cyperus difformis*, and sedges in rice and paddy fields[1]. Acute human intoxication through ingestion of pretilachlor has rarely been documented. Organophosphorus pesticide self-poisoning is one of the major clinical and public health problems across much of rural Asia with an estimated 5,00,000 deaths each year and about 60% are due to pesticide poisoning[1]. We report a case of suicidal ingestion of the pretilachlor poison with clinical manifestations similar to organophosphate toxicity. Clinicians should be aware of such mimickers for proper management of the patient. Chloroacetanilides are a class of herbicides that includes alachlor, butachlor, metachlor, and pretilachlor[2]. Pretilachlor, specifically, is a systemic herbicide with a broad-spectrum effect. Its chemical name is 2-chloro-2′,6′-diethyl-*N*-(2-propoxyethyl) acetanilide. It is highly effective against annual weeds, sedges, and broadleaf weeds in rice fields[2,3]. The exact mechanism of action of these herbicides is not yet fully understood, but they are known to inhibit the synthesis of fatty acids, lipids, proteins, flavonoids, and other compounds[3]. Chronic exposure to pretilachlor poison has shown some carcinogenic effects; however, acute toxicity from this group of herbicides has not been reported in humans yet[2]. Acute pretilachlor poisoning due to ingestion can be mistaken for pesticides like organophosphates, resulting in fallacious

HIGHLIGHTS

- Acute oral intoxication of pretilachlor, a very rare case, can present with similar clinical manifestations of organophosphorus toxicity in humans.
- The effects of acute oral exposure are mild, and patients can present with vomiting, lacrimation, bowel and bladder incontinence, bradycardia, and hypotension, and it can be life-threatening as well.
- Vigilant monitoring and supportive care to ensure timely recovery is important despite not having any specific antidote.

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management[4]. We report a case of a 15-year-old male who presented to the emergency room of a hospital in rural Nepal after half an hour of suicidal ingestion of pretilachlor poison with decreased consciousness and multiple episodes of blood-mixed non-projectile vomiting.

Case presentation

A 15-year male came to the private hospital in rural Nepal after half an hour of suicidal ingestion of an unknown poison after a family dispute and presented with decreased consciousness and multiple episodes of non-projectile vomiting mixed with blood but did not have lacrimation, shortness of breath, chest pain, fever, urination, and fecal incontinence. He did not have any particular smell of poisoning. On examination, Glasgow Coma Scale (GCS) was 9/15 (eye opening-2, verbal response-2 and motor response-5), with pulse rate-62 beats per minute, blood pressure-100/70 mmHg, oxygen saturation of 98%, respiratory rate of 16 breaths per minute, and temperature of 98.4°F. His pupils were 2 mm in size bilaterally and reacting to light. His systemic examination findings were normal.

In the emergency, he was given atropine 0.6 mg [intravenous (i.v.)] stat followed by 3 mg in 50 ml normal saline at 3 ml per hour rate with the provisional diagnosis of organophosphorus poisoning. All the patient's vomit-soaked clothing was changed and skin was cleaned thoroughly with soap water, and gastric lavage was performed simultaneously. We ordered blood work, electrocardiograms, and imaging tests. The blood work showed the following results: pH of 7.351, partial pressure of oxygen at 37, and partial pressure of carbon dioxide at 40.9. The hematocrit was below normal limits at 37, while sodium was 141 mEq/l, chloride 117 mEq/l, potassium 3 mEq/l, calcium 0.70 mmol/l, glucose 6.7 mmol/l, lactic acid-1.4 mmol/l, bicarbonate-22.1 mmol/l, and anion gap-6 mmol/l. Additionally, creatinine was 0.7 mmol/l, urea was 13 mmol/l, white blood cell count was 7600, hemoglobin was 12.2 g%, platelet count was 109/mm^3, and mean platelet volume was 11.1/l. The liver function test, coagulation profile, electrocardiogram, chest X-ray, and ultrasonography of the abdomen all showed normal results.

A bottle of the herbicide pretilachlor 50% emulsifiable concentrate (EC) was found in his room and brought to the emergency room by his relatives after 1 h after which provisional diagnosis was changed to pretilachlor poisoning. The patient was treated with i.v. fluid 2 l within 12 h and with ceftriaxone 1 g i.v. two times per day, and pantoprazole 40 mg i.v. two times per day. The patient was monitored with generalized random blood sugar 5 hourly, which was normal, and monitored for decreased level of consciousness, heart rate, seizure, and decrease in respiratory rate. The patient was admitted for 5 days. Blood investigations, including electrolytes, were within normal limits throughout the stay. On day 2 GCS of the patient was eye opening-3, verbal response-3 and motor response-5, but there was a single episode of giant tonic–clonic seizure, which was managed with i.v. midazolam. Vitals were within normal limits throughout the stay except during seizure (tachycardia 125, SpO_2 90). On the third day, the GCS of the patient was 15/15, on days 4 and 5, the patient was well. The patient was discharged after 5 days of admission. He was counseled for psychiatric evaluations. In psychiatric counseling, the patient underwent a general psychiatric assessment to understand the contributing factors to taking pretilachlor, like stressors, family dynamics, and emotional state. Following this, he underwent psychoeducation to cope with the emotions and behaviors, cognitive behavioral therapy, and overall psychiatric counseling. Family members were also involved in family therapy to promote good understanding in the family. The patient's attitude was very good and he was more receptive to the psychiatric counseling, after which he gained emotional insights into the emotional struggles and developed better coping skills. His follow-up investigation of blood work was normal. Additionally, follow-up and support to the patient have ensured the patient's mental well-being and reduced the risk of future suicide attempts. Follow-up details of the patient showed no signs of neurotoxicity and genotoxicity with a very positive attitude toward mental health.

Discussion

Pretilachlor is a chloroacetanilide herbicide that is derived from natural compounds and is generally marketed in a 50% emulsifiable concentrate as a colorless and odorless liquid[2]. In-vitro and in-vivo studies, both have demonstrated that prolonged exposure to chloroacetanilide is strongly associated with the development of neurotoxicity, genotoxicity, and carcinogenicity. However, there is limited information available regarding the effects of acute oral exposure, and it is suggested that the outcomes may differ from chronic exposure[4]. According to a study conducted by Lo *et al*., involving 113 patients who were orally exposed to chloroacetanilides such as alachlor and butachlor, approximately one-fourth of the patients remained asymptomatic. The remaining patients experienced symptoms such as vomiting and a range of neurological manifestations, including drowsiness and central nervous system (CNS) depression. Tragically, three fatalities occurred among the patients, who developed profound hypotension and fell into a coma[5]. The symptoms affecting the CNS could be caused by either the direct effects of pretilachlor or the solvents added to the herbicides[3]. In a retrospective study including 35 patients of acute oral chloroacetanilide poisoning, the majority of patients showed low levels of toxicity[3]. However, it was observed that three patients fell into a coma, and one patient passed away 24 h after the exposure[3]. In our case, the patient presented with decreased consciousness and non-projectile, multiple episodes of vomiting with blood mixed but did not have lacrimation, shortness of breath, chest pain, fever, urination, and fecal incontinence. He also did not have the presence of the characteristic garlicky odor of organophosphorus toxicity, which suggested an alternative diagnosis, but the cholinesterase level was within the normal range in our patient.

The mechanism of action of this group of herbicides is still not clearly understood, but is known to act by inhibiting the biosynthesis of fatty acids, proteins, lipids, and flavonoids. However, the mechanism of action of organophosphates is inhibition of acetylcholinesterase (AChE), which is an enzyme that breaks down the neurotransmitter acetylcholine[6]. So, pretilachlor primarily affects the CNS and can lead to CNS depression, gastrointestinal irritation, seizures, and metabolic disturbances, while organophosphate poisoning primarily leads to cholinergic crisis and muscle paralysis, among other symptoms[6,7]. However, in poor resource settings like ours (in rural settings), clinical features of pretilachlor poisoning mimic organophosphorus toxicity,

making misdiagnosis in the Emergency Department common. Clinical features like vomiting, excessive lacrimation, bowel bladder incontinence, bradycardia, and hypotension are present in organophosphate poisoning as well as pretilachlor poisoning, making misdiagnosis difficult, especially in poor resource settings like ours[7]. These hypersecretory features like salivation, lacrimation, urination, defecation, emesis, and miosis in the case of organophosphate poisoning are due to parasympathetic overstimulation. However, with investigations like serum cholinesterase level, we can differentiate between the two as its level is decreased in organophosphate poisoning and remains normal in case of pretilachlor intoxication[7,8]. Atropine was given initially in the emergency room because the physician could clearly notice common symptoms that overlapped with the organophosphorus poisoning, but pretilachlor poisoning was confirmed when the patient's relatives brought a bottle of pretilachlor after 1 h retrieved from his room which was confirmed after asking the patient. Atropine acts as an antidote for cholinesterase inhibitor poisoning, restoring autonomic nervous system balance by blocking specific receptors[5]. It effectively manages symptoms of cholinergic toxicity, such as excessive salivation, tearing, bronchoconstriction, and bradycardia. No antidote has been available till now for pretilachlor poisoning, making symptomatic treatment and hemodynamic monitoring the mainstay of treatment[7]. In our case, we managed the patient symptomatically with i.v. fluid 2 l within 12 h and with ceftriaxone 1 g i.v. two times per day, pantoprazole 40 mg i.v. two times per day. Injectable atropine 0.6 mg i.v. stat followed by 3 mg in 50 ml normal saline at 3 ml per hour rate. The rationale for giving antibiotics is that ingested poison can lead to irritation and damage to the gastrointestinal tract. Potential exposure of the stomach lining to harmful bacteria can occur after the gastric lavage and multiple episodes of vomiting. It also increases the risk of developing aspiration pneumonia, often caused by bacterial infection. Moreover, in cases of acute poisoning, especially when gastrointestinal symptoms are present, a physician should administer antibiotics prophylactically to prevent potential bacterial infections that could arise during the course of hospitalization[2]. In this case, antibiotics were given prophylactically as the initial GCS of the patient was low and to prevent hospital-acquired infections and aspiration pneumonia. He was monitored with generalized random blood sugar 5 hourly, monitored for decreased level of consciousness, heart rate, seizure, and decrease in respiratory rate. The patient's follow-up blood tests showed normal results, and after being hospitalized for 5 days, he was discharged. He received counseling for psychiatric evaluations. Hence, it is advisable to conduct additional studies that provide a comprehensive understanding of how this drug affects the human body, including its mechanism of action, and to develop definitive management strategies to effectively counteract its toxic effects.

Conclusion

This case highlights the importance of early stabilization, continuous and careful monitoring, and supportive treatment for a timely recovery in cases of pretilachlor poisoning, despite its clinical manifestations resembling those of organophosphorus poisoning. This case report emphasizes the significance of educating and creating awareness among treating physicians about potential mimickers such as organophosphates. It is crucial to retrieve the poison container, if possible, to identify the active compound. It is recommended to redesign containers with clear warning labels for the general public and restrict the over-the-counter availability of this herbicide.

Ethical approval

The ethical committee of our institute 'IOM-IRC' does not require approval for case reports.

Consent

Written informed consent was obtained from the patient for the publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

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Author contribution

P.N., S.A., S.A. and P.G.: wrote the original manuscript, reviewed, and edited the original manuscript; R.P., A.U.,.S.K., A.U., B.G., and L.R.B.: reviewed and edited the original manuscript.

Conflicts of interest disclosure

Authors have no conflicts of interest to declare.

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