

## Human Poisoning due to Delphinium species in the Himalayan Region of Nepal: A Case Report

Santosh Adhikari,<sup>1</sup> Abhishek Bhandari<sup>2</sup>

<sup>1</sup>Manang District Hospital, Manang, Nepal, <sup>2</sup>Sindhuli Hospital, Sindhuli, Nepal.

### ABSTRACT

The *Delphinium* species herb, common name 'Nirmasi' in Nepal, is one of the community level flower herbs used as medicinal ingredients in various clinical problems in Manang District and other Himalayan parts of Nepal. Roots of the plants from the genus *Delphinium* have been used for a long time for headache, epilepsy, mania, paralysis, rheumatism, toothache, and various types of pain. However, many species of *Delphinium* are poisonous and look quite similar in morphology to the beneficial ones. As a result, accidental poisoning is common. Poisoning due to these plants results in symptoms due to gastric irritation, competitive neuromuscular blockade, and cardiotoxicity caused by various alkaloids present in them. We report here a case of poisoning due to *Delphinium* species ingestion presenting as hypotension and bradycardia managed successfully with symptomatic treatment.

**Keywords:** alkaloids; *Delphinium*; neuromuscular blockade; poisoning.

### INTRODUCTION

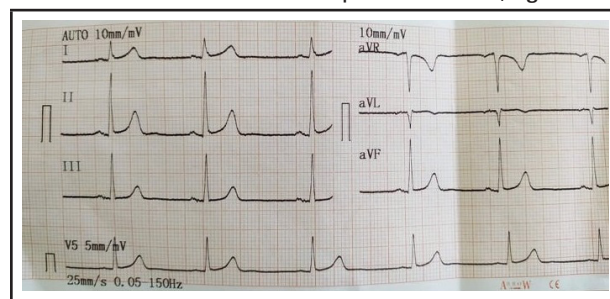
*Delphinium brunonianum*, *D. himalayai*, and *D. stapeliosum* are some of the species found in Nepal, India, and the Himalaya Mountains.<sup>1</sup> Their roots have been used for the treatment of fever, headache, stomachache, jaundice, and skin rashes.<sup>2</sup> However, some species are toxic and the toxicity of the genus *Delphinium* is variable depending on growth stages and concentration of a toxic substance.<sup>3</sup> Poisoning usually occurs in grazing cattle and is rare in humans. So, mistaking the medicinal species, a poisonous species may be ingested leading to poisoning in humans. This report details a case of *Delphinium* species poisoning presented with bradycardia and hypotension.

### CASE REPORT

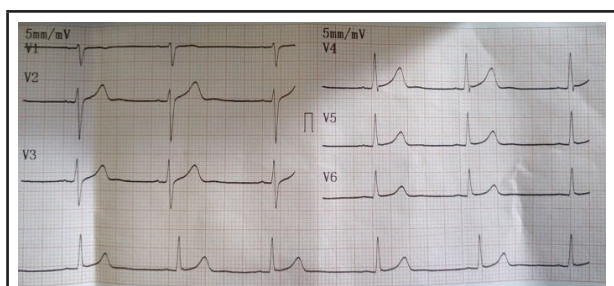
A 32-year male without any past comorbid illness, presented in the emergency unit of Manang District Hospital, Chame, Manang, Nepal with a history of ingestion of herbal plant 'Nirmasi' (*Delphinium*) followed by multiple episodes of vomiting containing ingested food particles, generalized tingling, and burning sensation, restlessness, and agitation after

three hours of ingestion. The patient had taken the plant product as a normal tonic intake. On presentation to an emergency, the patient was anxious but well oriented to time, place, and person, and was vomiting actively. The patient had a blood pressure of 80/60 mm of Hg, a heart rate of 53 beats/minute, an axillary temperature of 97.0 Fahrenheit, and a respiratory rate of 22 breaths per minute, and capillary oxygen saturation of 96% in room air. Systemic examination, including the cardiovascular and respiratory system, was normal.

Immediate twelve lead ECG showed sinus bradycardia with a rate of 54 beats per minute (Figure 1).



**Correspondence:** Dr. Santosh Adhikari, Manang District Hospital, Chame-4, Manang, Nepal. Email: adsantoshda11@gmail.com, Phone: +977-9846659827.



**Figure 1.** Electrocardiogram showing sinus bradycardia.

All the investigations including hemoglobin, total leukocyte count, differential leukocyte count, serum sodium, potassium, urea, and creatinine, and serum level of liver enzymes were within the normal range (Table 1).

**Table 1.** Value of lab parameters.

Lab Parameters (units)	Value at admission
Total Leucocyte Count (cells/mm <sup>3</sup> )	7100
Differential Leucocyte count (% of Total Leucocyte count)	Neutrophil 65% Lymphocyte 35%
Hemoglobin (g/dl)	13.6
Serum urea (mg/dl)	20
Serum Creatinine (mg/dl)	0.8
Serum Sodium (mmol/L)	138
Serum Potassium (mmol/L)	4.1
Serum Total Bilirubin (mg/dl)	1.4

The patient was given bolus intravenous crystalloids at 20ml/kg within 30 minutes and was kept in Atropine infusion to maintain mean arterial pressure above 70 mmHg and heart rate above 50 beats per minute. The patient was kept nil per oral and received maintenance fluid at 80 ml/hour, injectable proton pump inhibitor, and antiemetic. After eight hours of treatment, atropine infusion was withheld and his heart rate normalized to 70 to 75 beats per minute and twelve-lead electrocardiography showed normal sinus rhythm which persisted throughout the hospital stay. The patient also made adequate urine output of 60 ml per hour over this time and continued to do so during a hospital stay. Symptoms of vomiting also subsided over this time. The patient was discharged after 48 hours of observation in the medical ward without complications.

## DISCUSSION

Extracts from various *Delphinium* species like *Delphiniumbrunonianum*, *D. himalayai*, and *D. stapeliosum* namely  $\beta$ -amyrin,  $\beta$ -sitosterol, etc. exhibited antibacterial properties against various bacteria like *Staphylococcus aureus*, *Pseudomonas aureginous*, *Escherchia coli*, etc.<sup>2</sup> However, other extracts like methylsuccimidoanthronyllycoctonine (MSAL) and the lycoctonine group of alkaloids found in *Delphinium peregrinum* have the toxic effect of causing neuromuscular paralysis via competitive inhibition of post-synaptic neurotransmitter acetylcholine, specifically acting at the  $\alpha$ 1 nicotinic sites in the brain and muscle, causing respiratory depression and other curare-like symptoms.<sup>4,5</sup> Other *Delphinium* alkaloids like methyllycaconitine (MLA), nudicauline, barbinine, deltalineetc also block neuromuscular transmission by acting as nicotinic receptor antagonist.<sup>5,6</sup> Our patient presented with complaints of dizziness secondary to bradycardia and hypotension which could be the effect of such alkaloids competitively inhibiting the acetylcholine at preganglionic sympathetic synapse blocking the sympathetic outflow to the heart.

There has been no specific antidote noted for *Delphinium* poisoning in humans. However, physostigmine has been shown to reverse the effects of the alkaloids present in *Delphinium* in cattle.<sup>7</sup> In our patient, symptomatic emergency care with appropriate fluids and low dose atropine improved hypotension and bradycardia within a short period. So, the patient's history of consumption of this *Delphinium* plant parts is ultimate for diagnosis in Nepal. So far, proper studies have not been done in Nepal to identify the medical value and toxicity of different species of *Delphinium*. This sort of accidental poisoning warrants such studies and the creation of awareness among residents of areas where *Delphinium* is a common medicinal plant. Also, with timely intervention and observation patients presenting with poisoning due to these plants can be treated with easily available and cheap drugs with good results. Physicians working in areas where homeopathic medicines are commonly used must look into these types of patients with a high index of suspicion.

**Consent:** [JNMA Case Report Consent Form](#) was signed by the patient and the original article is attached to the patient's chart.

**Conflict of Interest:** None.

## REFERENCES

1. Gewali MB. Aspects of Traditional Medicine in Nepal. 1st ed. Japan: Institute of Natural Medicine University of Toyama;2008 [cited: 2013 Sep 24] p.71-152. Available from: <https://lib.icimod.org/api/files/c81c256f-f2de-42be-9909-3aa21b918e2e/3615.pdf>. [Full Text]
2. Tripathi HP, Sharma RP, Timilsina YP, Pathak R, Devkota KP. An assessment of ethnomedicinal use, chemical constituents analysis and bioactivity evaluation on high altitude medicinal plant *Delphinium brunonianum* of Manang district. Nepal Journal of Science and Technology. 2011;12:111-8. [Full Text | DOI]
3. Manners GD, Panter KE, Ralphs MH, Pfister JA, Olsen JD, James LF. Toxicity and chemical phenology of norditerpenoid alkaloids in the tall larkspurs (*Delphinium* species). Journal of Agricultural and Food Chemistry. 1993 Jan;41(1):96-100. [Full Text | DOI]
4. Manners GD, Panter KE, Pelletier SW. Structure-activity relationships of norditerpenoid alkaloids occurring in toxic larkspur (*Delphinium*) species. Journal of Natural Products. 1995 Jun;58(6):863-9. [PubMed | Full Text | DOI]
5. Dobelis P, Madl JE, Pfister JA, Manners GD, Walrond JP. Effects of *Delphinium* alkaloids on neuromuscular transmission. Journal of Pharmacology and Experimental Therapeutics. 1999 Nov 1;291(2):538-46. [PubMed | Full Text]
6. Tomassoni AJ, Snook CP, McConville BJ, Siegel EG. Recreational use of delphinium—an ancient poison revisited. J Toxicol Clin Toxicol. 1996;34(5):598.
7. Pfister JA, Panter KE, Manners GD, Cheney CD. Reversal of tall larkspur (*Delphinium barbeyi*) poisoning in cattle with physostigmine. Veterinary and Human Toxicology. 1994 Dec 1;36(6):511-4. [PubMed]

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