



A Case Report

Clinical Profile of Patient with Amitraz Compound Intoxication Attending Emergency Department KIMS Koppal

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Abstract :

Background: Amitraz, a formamidine pesticide widely used in veterinary and agricultural practice, has emerged as an important cause of poisoning in India. Its clinical manifestations often resemble organophosphorus or clonidine poisoning, making early diagnosis difficult. However, epidemiological data from southern India remain limited.

Objectives: To evaluate the demographic characteristics, clinical profile, complications, management, and outcomes of patients with Amitraz poisoning presenting to a tertiary care hospital.

Methods: A prospective observational study was conducted at KIMS Teaching Hospital, Koppal, from July 2023 to December 2024. Fifty adult patients with confirmed Amitraz poisoning were enrolled. Demographic details, clinical features, laboratory investigations, treatment, and outcomes were recorded. Routine investigations included complete blood count, renal and liver function tests, arterial

blood gas analysis, electrocardiography, and chest radiography. Data were analyzed using SPSS version 21.0.

Results: Patients aged 18–30 years constituted 54% of the study population, with males accounting for 68%. Farmers were the most affected occupational group (46%), and suicidal ingestion accounted for 98% of cases. Vomiting (92%), nausea (68%), and dizziness (48%) were the commonest symptoms. Bradycardia, tachycardia, hypotension, and pupillary abnormalities were observed in 12%, 28%, 22%, and 40% of patients, respectively. Hyperglycemia and glycosuria occurred in 14%, while respiratory alkalosis (8%) and metabolic acidosis (4%) were uncommon. Ventilatory support was required in 14%, whereas 86% recovered with supportive care.

Conclusion: Amitraz poisoning predominantly affects young males following intentional ingestion. Although cardiovascular and metabolic complications may occur, most patients recover with early diagnosis and prompt supportive management.

Keywords: Amitraz poisoning, α 2-adrenergic agonist, pesticide toxicity, clinical profile, supportive treatment, emergency medicine.

Introduction

Amitraz is a pesticide belonging to the formamidine group and is widely utilized as an ectoparasiticide for animals such as dogs, cattle, and sheep. It also finds application in agriculture, particularly for the treatment of fruit crops. In recent years, there has been a noticeable increase in reported cases of Amitraz poisoning, likely linked to its growing use, partly as a substitute for organophosphorus compounds, which have seen a decline due to rising concerns and regulatory discouragement regarding their toxicity[1-3].

Globally, poisoning is a significant public health concern, claiming the lives of nearly 700 individuals each day. For every fatal case, thousands more suffer non-fatal toxic exposures, impacting people across all age groups, regions, and economic backgrounds. Traditionally, organophosphorus compounds have been the leading cause of poisoning in India and other developing nations. However, with the increased availability of various pesticides and insecticides, cases involving non-organophosphorus compounds are on the rise. Among these, Amitraz has emerged as a noteworthy and increasingly reported toxic agent in the community.[4-8]

Human exposure to Amitraz can be accidental or intentional, occurring through various routes such as ingestion, inhalation, or dermal contact. Clinically, its toxic effects can mimic clonidine poisoning, owing to its α_2 -adrenergic agonist activity. Additionally, it may present with symptoms similar to those seen in organophosphate or carbamate poisoning, often complicating the initial diagnosis and management.[1,4-6]

Despite its growing prevalence, epidemiological data on Amitraz poisoning in India remain scarce, highlighting the need for further research to better understand its clinical profile and outcomes, and this study was conducted for the same.

Objective of the Study

This study was conducted with the primary objective of evaluating the clinical profile of patients presenting with Amitraz compound poisoning to the emergency department and to determine the complications arising from the poisoning and the patients' response to treatment.

Methodology

We conducted a prospective observational study and was conducted at the KIMS Teaching Hospital, Koppal. The study covered an 18-month period, extending from 01 July 2023 to 31 December 2024, and included a sample size of 50 patients. The study obtained ethical clearance from the Institutional Ethics Committee of KIMS Teaching Hospital, Koppal. All patients underwent routine diagnostic procedures required for proper clinical management, and no additional

invasive interventions were performed outside the standard of care.

Informed consent of participating individuals was obtained. All patients aged 18 years or older with a definitive history of Amitraz compound ingestion were included in the study. Patients were excluded if they were below 18 years of age, had ingested multiple poisons, or had consumed alcohol along with Amitraz, as these factors could confound the clinical presentation and outcomes.

Data were collected prospectively from patients admitted to the emergency or medicine departments. Each case was analyzed based on demographic characteristics (age, sex), presenting clinical signs and symptoms, the type of treatment provided (including the need for ventilatory support), the duration of hospital stay, and the final outcome (recovery or complications). All patients underwent a series of baseline investigations upon admission to facilitate diagnosis and monitoring.

The diagnostic workup included a broad panel of blood and biochemical tests to evaluate the systemic impact of Amitraz poisoning. These included:

- Complete Blood Count: Hemoglobin, RBC count, total leukocyte count, and platelet count.
- Renal Function Tests: Blood urea and serum creatinine levels.
- Serum Electrolytes: Sodium, potassium, and chloride.
- Liver Function Tests: Total bilirubin, direct bilirubin, total protein, AST (SGOT), ALT (SGPT), and alkaline phosphatase (ALP).
- Metabolic Parameters: Random blood glucose levels and urine glucose levels.
- Arterial Blood Gas Analysis: Including pH, PCO_2 , PO_2 , and HCO_3^- .
- Imaging and Cardiac Evaluation: Chest X-ray and electrocardiogram (ECG).

The data was collected and compiled in MS Excel. Descriptive statistics has been used to present the data. To analyse the data SPSS (Version 21.0) was used. Significance level was fixed as 5% ($\alpha = 0.05$). Qualitative variables are expressed as frequency and percentages and Quantitative variables are expressed as Mean and

Standard Deviation. To compare the proportion between variables, chi-square test was used.

Results

The study population included 50 individuals of varying age groups, with the majority (54%, n=27) falling within the 18–30 years range, as shown in Table 1. This trend suggests that young adults are the most commonly affected demographic. A smaller, yet significant proportion (34%, n=17) belonged to the 31–50 years category, while only 12% (n=6) were in the 51–70 age group.

Gender distribution in Table 1 reveals a male predominance, with 68% (n=34) of patients being male and 32% (n=16) female. Regarding occupation, the most frequently affected group was farmers (46%, n=23). Labourers constituted 30% (n=15), housewives 14% (n=7), and students 10% (n=5). The clinical symptoms, depicted in Figure 1, highlights that vomiting (n=46, 92%) was the most commonest symptom followed by nausea (n=34, 68%), dizziness (n=24, 48%) and abdominal pain (n=2, 4%) respectively.

Table 2 provides insight into the clinical characteristics observed. Nearly all patients (98%, n=49) ingested Amitraz with suicidal intent, while only one case (2%) was accidental. Hemodynamic data show that 78% (n=39) had normal blood pressure, but 22% (n=11) presented with hypotension. Most patients (94%, n=47) had normal body temperature, while 6% (n=3) were hypothermic.

Urine output was normal in 82% (n=41) of patients, whereas 18% (n=9) had polyuria. Pupil size varied significantly among patients: 60% (n=30) had normal pupils, while 26% (n=13) showed miosis, 8% (n=4) had dilated pupils, and 6% (n=3) presented with mydriasis.

Vital signs and laboratory results, summarized in Table 3, demonstrate that 60% (n=30) of patients had a normal heart rate. However, tachycardia was observed in 28% (n=14), and bradycardia in 12% (n=6), blood glucose levels were elevated in 14% (n=7), with corresponding glycosuria in the same proportion. Arterial blood gas analysis revealed that most patients (88%, n=44) had normal values. However, 8% (n=4) showed respiratory alkalosis, and 4% (n=2) had metabolic acidosis. Figure 2

illustrates the management provided to our study participants, where 14% required ventilatory support and 86% did not require the same.

Discussion

In the present study, the population consisted of 50 individuals presenting with Amitraz compound intoxication. The majority of patients (54%, n = 27) were in the 18–30 years age group, suggesting that young adults were the most commonly affected demographic. A smaller yet notable proportion (34%, n = 17) belonged to the 31–50 years category, while only 12% (n = 6) were between 51–70 years, whereas the Dange et al. [9] study among 95 patients, reported a mean age of 32.4 years, with 50% of patients below 30 years, 34% between 30–50 years, and 16% above 50 years. In comparison, the Ilyas et al. [6] case involved a single 40-year-old male, also presenting with suicidal intent. Similarly, the Jalawadi et al. [10] study analyzed a cohort of 76 patients, with a mean age of 30.3 ± 14.27 years, where the age group most affected was 20–29 years [36.8%], and Addepalli et al. [11] reported 8 cases with a majority (75%) under 30 years consistent with our findings. This age distribution indicates that Amitraz poisoning predominantly affects younger and middle-aged individuals, likely due to increased exposure from occupational or domestic environments.

In our study, a male predominance was observed, with 68% (n = 34) of the cases being male and 32% (n = 16) female. This may reflect greater occupational exposure among males, especially in agricultural work, or differences in psychosocial behavior, while in Dange et al. [9] study, the majority were female (58%), and males constituted 42% whereas the Jalawadi et al. [10] study and Addepalli et al. [11] study reported an equal distribution of 50% males and 50% females respectively.

In terms of occupation, farmers made up the largest affected group (46%, n = 23), followed by labourers (30%, n = 15), housewives (14%, n = 7), and students (10%, n = 5), whereas the Dange et al. [9] study reported students (37%) as the leading group, followed by farmers (34%), housewives (17%). However, the occupational background was more varied—daily wagers and students (25% each) topped the list, followed by farmers,

home guards, and sales workers in the Addepalli et al. [11] study. These findings suggest that while occupational exposure is a key factor, other groups, including those in domestic settings, are also at risk.

In our study, 98% (n = 49) of the cases resulted from suicidal ingestion, while only 2% (n = 1) were accidental. Meanwhile, Dange et al. [9] reported 86% suicidal, 10% accidental, and 4% involving alcohol. This highlights a serious mental health concern and underscores the accessibility of Amitraz as a means of self-harm.

In the current study, the most frequently reported clinical symptom was vomiting, present in 92% (n = 46) of patients. This was followed by nausea in 68% (n = 34), dizziness in 48% (n = 24), and abdominal pain in 4% (n = 2). These symptoms align with known gastrointestinal and central nervous system effects of Amitraz and reflect its typical pattern of toxicity.

In the present study, 22% (n = 11) of patients presented with hypotension, while 78% (n = 39) had normal blood pressure, consistent with Amitraz's known effect on α -2 adrenergic receptors. Activation of central α -2 adrenergic receptor agonists stimulates presynaptic receptors, causing a reduction in peripheral sympathetic outflow and resulting in lowered blood pressure. This hypotensive effect is further intensified by xylene, a solvent often present in Amitraz formulations, which contributes additional central nervous system depressant effects.[18]

In our study, 94% (n = 47) of patients maintained normal body temperature, whereas 6% (n = 3) exhibited hypothermia, which may result from metabolic suppression due to the sedative properties of the compound, whereas Ertekin et al. [19] and Ulukaya et al. [20] observed 9.33% and 33% of their patients having hypothermia in their studies respectively. In the current study, urine output was found to be normal in 82% (n = 41) of cases, while 18% (n = 9) experienced polyuria, which may be attributed to transient renal involvement or fluid therapy. In the present study, pupil size varied among patients: 60% (n = 30) had normal pupils, 26% (n = 13) had miosis, 8% (n = 4) had dilated pupils, and 6% (n = 3) showed mydriasis, indicating a range of autonomic nervous system effects due to Amitraz

toxicity.

In our study, heart rate was found to be normal in 60% (n = 30) of patients, while 28% (n = 14) exhibited tachycardia and 12% (n = 6) had bradycardia, whereas Avsarogullari et al. [17] found bradycardia among 8.7% of their cases. These findings highlight the complex cardiovascular effects of Amitraz, reflecting both sympathetic and parasympathetic influences. Similarly, Dange et al. [9] reported vomiting in 55%, increased GI motility in 23%, bradycardia in 22%, dizziness in 17%, hypotension in 12%, and polyuria in 8%.

Similar to our study, in the Jalawadi et al. [10] study, the most common presenting symptom was vomiting, seen in 90.8% of patients, followed by loss of consciousness (31.6%) and drowsiness (23.7%). Miosis was the most frequent clinical sign, observed in 73.7% of cases. Other pupillary changes included mid-dilated pupils (3.9%), mydriasis (5.2%), and normal pupils (17.1%). Cardiovascular findings included hypotension in 32.9%, hypertension in 10.5%, and normal blood pressure in 55.6%. Hypothermia was recorded in 15.8% of their patients respectively. Also, Avsarogullari et al. [17] found miosis among 26.08% of their cases.

In accordance to our study findings, in the study by Addepalli et al. [11], vomiting was the most common presenting symptom, observed in 75% of patients. This was followed by drowsiness and abdominal pain, each reported in 50% of the cases. Other symptoms included diarrhea and sweating (both in 37.5%), and disorientation in 25% of patients. Bradycardia was a notable finding, occurring in 50% of cases, while blood pressure abnormalities included hypotension in 25% and hypertension in 25%, with the remaining patients maintaining normal readings. Hyperthermia was reported in 25% of patients, and miosis was the most frequent pupillary abnormality, seen in 62.5% of their cases. These findings highlight a spectrum of autonomic and systemic manifestations associated with Amitraz poisoning in this case series.

In the current study, hyperglycemia was observed in 14% (n = 7) of patients, with an equal number exhibiting glycosuria, likely due to stress-induced hyperglycemia or direct interference with glucose metabolism by the toxin. However,

in Dange et al.[9], only 3% had hyperglycemia and 3% showed glycosuria, suggesting fewer metabolic disturbances in that cohort. At the same time, Jalawadi et al.[10] reported a mean blood glucose of 148.61 ± 58.24 mg/dL, and noted that glucose levels normalized without specific treatment, suggesting transient hyperglycemia consistent with stress response. Also, Addepalli et al.[11] found hyperglycemia in 25% of their cases, with an average blood sugar level of 173 ± 66.97 mg/dL, indicating greater metabolic disturbance in their patients and Avsarogullari et al.[17] found 60.6% of their patients with hyperglycemia respectively.

At the same time, a study by Deepak et al.[14] reported a mean blood glucose level of 132.18 mg% in patients with Amitraz poisoning. The occurrence of hyperglycemia in such cases is believed to result from the activation of α 2-adrenergic receptors, which stimulates glucagon release while simultaneously suppressing insulin secretion, ultimately leading to elevated blood sugar levels. Hyperglycemia associated with acute poisoning has been recognized as a useful marker for gauging poisoning severity and predicting clinical outcomes. Amitraz poisoning, in particular, is well known to be linked with hyperglycemic episodes.[15,16]

Comparatively, the Ilyas et al. [6] patient had a more severe presentation: he arrived unconscious (GCS 3), with profound bradycardia (HR 34 bpm) and hypotension (BP 80/50 mmHg). Oxygen saturation was critically low (68% on room air), and he showed signs of respiratory compromise, requiring intubation and ventilatory support, however pupils were normal, and bedside glucose was 119 mg/dL in their case report.

In our study, arterial blood gas analysis showed normal results in 88% (n = 44) of patients. However, respiratory alkalosis was noted in 8% (n = 4), and metabolic acidosis in 4% (n = 2), indicating that a small subset of patients experienced metabolic or respiratory disturbances secondary to poisoning, whereas Jalawadi et al.[10] in their ABG analysis revealed metabolic acidosis in 39.5% and respiratory acidosis in 9.2%, significantly higher than our study and Addepalli et al. [11] documented metabolic acidosis in 75%, and respiratory

acidosis and metabolic alkalosis in 12.5% each. In a study conducted by Kalyoncu et al.[13], respiratory alkalosis was identified in two patients, while three cases presented with respiratory acidosis, and five patients were found to have metabolic acidosis. Similarly, research by Surendra et al.[12] reported that out of the total number of patients examined, six exhibited respiratory acidosis, and two were diagnosed with respiratory alkalosis.

In the present study, the management approach included supportive care for most patients. While 86% of individuals did not require ventilatory assistance, 14% required ventilatory support, suggesting that although Amitraz poisoning can often be managed conservatively, a significant minority may present with severe toxicity necessitating intensive care. Similarly, Jalawadi et al. [10] reported mechanical ventilation in 28.9% of patients, whereas 25% of patients in Addepalli et al. [11] report and 37.5% in the Surendra et al.[12] study required mechanical ventilation.

Comparatively, Dange et al.[9] provided detailed ICU/hospital stay data: 68% of patients stayed in ICU for one day, 23% for two days, and 9% for more than two days. Regarding total hospital stay, 30% stayed for one day, 24% for two days, 22% for three days, and 11% for more than four days. This data suggests that most patients improve within a short duration.

Conclusion

Our study highlighted that the Amitraz compound intoxication primarily affects young adult males, with suicidal ingestion being the predominant mode of exposure. The most common clinical manifestations include vomiting, nausea, dizziness, and hypotension, while a smaller proportion of patients present with cardiovascular, metabolic, or neurological disturbances. Most patients respond well to conservative management, and only a minority require ventilatory support or intensive care. The findings highlight the importance of early recognition and supportive treatment in improving outcomes.

Recommendations

Based on the study findings, there is a need

to increase awareness among healthcare providers regarding the clinical presentation and supportive management of Amitraz poisoning. Efforts should be made to educate agricultural workers and rural communities about the risks of exposure and safe handling of chemical compounds like Amitraz. Additionally, mental health screening and counseling services should be strengthened, especially in areas where pesticide-related suicides are prevalent. Future studies with larger sample sizes, multi-center involvement, and long-term follow-up are recommended to better understand the spectrum, prognosis, and prevention strategies for Amitraz intoxication.

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Table 1: The clinical profile, laboratory findings and supportive measures in amitraz poisoning

Parameter	Observation	Frequency (%)
Age group	18–30 years	27 (54%)
	31–50 years	17 (34%)
	51–70 years	6 (12%)
Gender	Male	34 (68%)
	Female	16 (32%)
Type of Exposure	Suicidal ingestion	49 (98%)
	Accidental	1 (2%)
Time to Hospital Arrival	Within 1 hour	33 (66%)
	1–3 hours	14 (28%)
	>3 hours	3 (6%)
Symptoms at Onset	Vomiting	46 (92%)
	Nausea	34 (68%)
	Dizziness	24 (48%)
	Abdominal Pain	2 (4%)
	Drowsiness	17 (34%)
	Disorientation	5 (10%)
	Seizures	1 (2%)
Vital Signs	Hypotension	11 (22%)
	Tachycardia	14 (28%)
	Bradycardia	6 (12%)
	Hypothermia (<36°C)	3 (6%)
	Fever (>38°C)	1 (2%)
Pupillary Response	Miosis	13 (26%)
	Mydriasis	3 (6%)
	Dilated pupils	4 (8%)
	Normal pupils	30 (60%)
Glycemic Status	Hyperglycemia (>140 mg/dL)	7 (14%)
	Glycosuria	7 (14%)
	Normal glucose	43 (86%)
Liver Enzymes (SGOT/SGPT)	Mildly elevated	9 (18%)
	Normal	41 (82%)

Parameter	Observation	Frequency (%)
Urine Output	Normal 41 (82%)	
	Polyuria	9 (18%)
ABG Analysis	Respiratory Alkalosis	4 (8%)
	Metabolic Acidosis	2 (4%)
ECG Findings	Normal	44 (88%)
	Sinus bradycardia	5 (10%)
	Sinus tachycardia	10 (20%)
	ST-T changes	3 (6%)
	Normal ECG	32 (64%)
Need for Ventilator Support	Required	7 (14%)
	Not required	43 (86%)
Mean Duration of Hospital Stay	<2 days	29 (58%)
	2–4 days	17 (34%)
	>4 days	4 (8%)
Outcome	Complete recovery	50 (100%)

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