ORIGINAL ARTICLE

Clinical Profile of Amitraz Poisoning

Shubhangi Dhadke[1], Vijayalaxmi Kantte[2], Vithal Dhadke[3], Manish Dhadke[4]

Abstract

Aims of the study: To study clinical presentation, complications and response to supportive management of Amitraz poisoning

Methods and Material: Fifty cases of acute Amitraz poisoning were studied in detail and compared with previous data from literature.

Results: All the fifty cases were brought to Dr. V.M. Govt. Medical college, among them thirty one cases were males and nineteen were females, with their age ranging from 14 years to 62 years. Mode of intoxication was oral route. Twenty cases were farmers. Two cases had accidental poisoning. The ingested amount was ranging from 10ml to 80 ml. Vomiting and nausea were the prominent symptoms, next were dizziness, lethargy, respiratory distress and pain abdomen. Hyperglycemia, glycosuria, were commonest manifestations. Three cases were treated with mechanical ventilation. All the cases responded to supportive treatment and recovered completely.

Conclusion: Vomiting and nausea were the commonest symptoms. Hyperglycemia and glycosuria was commonest sign. There was good response to supportive treatment. There was no complication and no mortality.

Introduction

The term poison first appeared in the English literature around in the year of 1230 A.D. to describe a potion or draught that was prepared with deadly ingredients.[1] The commonest agents of poisoning in India appear to be pesticides, sedatives, chemicals, alcohol, plant toxins, household poison.[2] Among such compounds, our interest is to study about Amitraz poisoning.

Amitraz, an insecticide and veterinary medicine.[3] Extensive search of literature revealed that only a few cases have been reported on poisoning with this insecticide in South East Asia.[4] Most of the commercial preparation of Amitraz contains 12.5-20% of the drug in organic solvents, especially xylene, which is a component of paints, cleaners and glue.[3]

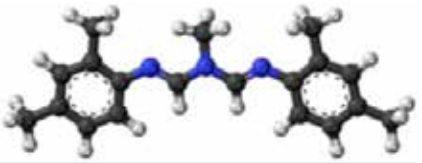

Fig. 1: Chemical formula of amitraz[9] : $C_{19}H_{23}N_3$

It was first synthesized in England in 1969.[5] The toxic effects of Amitraz are due to its -adrenergic agonist actions in the central nervous system and both α1 and α 2 adrenergic receptor stimulation in the periphery.[6] It also inhibits monoamine oxidase (MAO) enzyme activity[7] and prostaglandin E2 synthesis.[8] Toxic effects include numerous signs and symptoms varying from vomiting, nausea, dizziness, and lethargy, and respiratory distress, pain in abdomen, miosis, bradycardia, tachycardia, hypotension, hypothermia, hyperglycemia, glycosuria, polyuria and respiratory alkalosis.

Aims and Objectives

To study clinical presentation, complications and response to supportive management of Amitraz poisoning

Subjects and Methods

'Clinical profile of Amitraz poisoning' a descriptive observational study was conducted in tertiary care hospital in western Maharashtra from September 2013 to December 2016. In this study period 50 cases with definitive history of Amitraz poisoning were included. Cases were analysed as per age, sex, occupation, duration since consumption, quantity consumed, intention of poisoning, route of poisoning, symptoms, signs, systemic examination, investigations, treatment given, requirement of ventilator support, duration of hospital stay and outcome. Laboratory investigations done in these cases were complete blood count, urine examination, renal function test, liver function test, blood sugar levels Hyperglycemia (Random blood sugar more than 200mg/dl), urine output, arterial blood gases study, serum electrolytes, chest x ray, electrocardiogram. Cases with age less than 13 years were excluded.

Table 1: Sex wise distribution of cases

Sex	Males	Females	Total
Number of patients	31	19	50
Percent of patients (%)	62	38	100

Results

Table 1, 2, 3 and 4 shows that, thirty one cases (62 %) were males and nineteen cases (38%) were females. Among them maximum (40%) cases were present in age group of third decade and minimum cases (06%) were present in fifth and sixth decade. Maximum cases (40%) were farmers and minimum cases (14%) were students. Forty eight cases (96%) had suicidal poisoning while two cases (04%) had accidental poisoning. Mode of intoxication was oral route in all cases. The ingested amount was ranging from 10ml to 80 ml.

Table 5 indicates that vomiting (84%), nausea (66%) and dizziness (56%) were commonest symptoms. Other less common symptoms were lethargy (30%), and pain abdomen

[1]Associate Professor, [2]Assistant Professor, [3]Professor, [4]Intern, Dr. V.M. Govt. Medical College, Solapur, Maharashtra
Received: 11.02.2018; Revised: 14.08.2018; Accepted: 14.08.2018

Table 2: Age wise distribution of cases

Age (years)	No. of patients	Percentage (%)
14-20	07	14
21-30	20	40
31-40	06	12
41-50	10	20
51-60	04	08
61 and above	03	06
Total	50	100

Table 4: Intention of poisoning

Intention of poisoning	Suicidal	Accidental	Total
No. of patients	48	2	50
Percent of patients (%)	96	04	100

Table 7: Effect of amitraz poison on blood pressure

Blood pressure (mm of hg)	Normal	Hypotension	Total
Number of patients	44	06	50
Percent of patients (%)	88	12	100

Table 8: Effect of amitraz on body temperature

Temperature	Normal	Hypothermia	Total
Number of patients	42	8	50
Percent of patients (%)	84	16	100

Table 9: Effect of amitraz on the size of the pupils

Size of pupils	Normal	Miosis	Total
Number of patients	44	6	50
Percent of patients (%)	88	12	100

Table 10: Effect of amitraz on urine output

Urine output	Normal	Polyuria
Number of patients	32	18
Percent of patients (%)	64	36

(10%). Table 6 and 7 show bradycardia and hypotension was present 6 (12%). Table 8 shows hypothermia was present in 8 (16%)cases. Table 9 indicates pupillary abnormality in the form of miosis was present in 6 (12%) cases. As per Table 10 polyuria was seen in 18 (36%) and Tables 11 and 12 hyperglycemia and glycosuria respectively were seen in 36 (72%) cases. Table 13 depicts that respiratory alkalosis was seen in 4 (08%) cases and Table 14 shows that maximum cases 46 (92%) were treated with supportive measures. Four cases (08%) with severe respiratory distress were treated with ventilator support. The maximum duration of hospital stay was 6 days and was present in 4 cases (08%). All the cases recovered completely. The renal function test, liver function test, serum electrolytes, chest x ray

Table 3: Occupation wise distribution of cases

Occupation	Farmers	Labours	Housewives	Students	Total
No. of patients	20	10	13	7	50
Percent of patients (%)	40	20	26	14	100

Table 5: Incidence of symptoms in cases

Symptoms	Vomiting	Nausea	Dizziness	Lethargy	Pain abdomen
Number of patients	42	33	28	15	5
Percent of patients (%)	84	66	56	30	10

Table 6: Effect of amitraz poison on heart rate

Heart rate/min	Bradycardia	Normal	Tachycardia	Total
Number of patients	6	39	5	50
Percent of patients (%)	12	78	10	100

Table 11: Effect of amitraz on blood sugar level

Blood sugar	Normal	Hyperglycemia	Total
Number of patients	14	36	50
Percent of patients (%)	28	72	100

Table 12: Effect of amitraz on urine sugar level

Urine sugar	Normal	Glycosuria	Total
Number of patients	14	36	50
Percent of patients (%)	28	72	100

Table 13: Effect of amitraz on arterial blood gas analysis

ABGA	Normal	Respiratory alkalosis
Number of patients	46	04
Percent of patients (%)	92	08

and electrocardiogram were within normal limit. Gastric lavage was given to all fifty cases. Antibiotic therapies were given only to the intubated cases and were gradually weaned off from ventilator. All cases were treated with intravenous fluids. Hypotension, bradycardia, hypothermia, and pupillary abnormalities responded slowly to given treatment.

Discussion

Present study 'Clinical Profile Of Amitraz Poisoning' an observational study was conducted in Dr. V. M. Government Medical College, Solapur, from September 2013 to December 2016.In this study period 50 cases of Amitraz poisoning were evaluated for their clinical presentation, management and outcome.

Effect of Amitraz Poison on Heart Rate (Table 6)

In present study 39 (78%) patients had normal heart rate. Bradycardia was seen in 6 (12%) patients. Present study correlate with following studies:

Table 14: Distribution of patients according to management

Management	Ventillatory support	Supportive Measures	Total
Number of patients	04	46	50
Percent of patients (%)	8	92	100

Table 15: Duration of hospital stay

Duration of stay in days	Number of patients	Percent %
1	00	00
2	16	32
3	15	30
4	09	18
5	06	12
6	04	08

Avsarogullari L et al[10] in their study of 23 patients, bradycardia was present in 2 (8.7%) patients. Remaining 21 (91.3%) patients had normal heart rate.

Effect of amitraz poison on blood pressure (Table 7)

In present study 6 (12%) patients of poisoning had hypotension. Maximum number of patients had normal blood pressure 44 (88%).Present study correlates with following studies:

Hasan et al[12] mentioned, in their study of 7 cases, 1(14.33%) patients had hypotension. Normal blood pressure was present in 6(85.66%) patients. Central α2 adrenergic receptor agonist stimulates pre synaptic receptors and causes hypotension, and diminishes peripheral sympathetic tone, lowering the blood pressure with augmentation by the depressive effects of xylene.[15]

Effect of amitraz on body temperature (Table 8)

In present study of 50 cases, 8(16%) patients had hypothermia. While 42 (804%) patients had normal body temperature. Present study correlates with following studies:

Ertekin v et al[9] mentioned, in their

study of 21 cases of amitraz poisoning, 2 (9.33%) patients had hypothermia. The remaining 19 (90.66%) had normal body temperature. Alpha-adrenergic agonists are known to affect the thermoregulation centre at the hypothalamus. Amitraz due to its α-agonist action decreases body temperature.This action has also been reported for other α-agonists such as xylene and detomidine.

Effect of Amitraz on Size of the Pupils (Table 9)

In present study of 50 patients 6 (12%) patients were having miosis. Normal sized pupils was present in 44 (88%) patients. Present study correlates with following studies:

Avsarogullari L et al[10] studied 23 patients of amitraz poisoning.In their study there miosis was present in 6(26.08%) patients and 14(60.86%) patients had normal sized pupils. Low doses of α2 adrenergic agonists induces miosis by its pre synaptic effect and at higher doses it is known to cause mydriasis[15] due to its post synaptic effect.

Effect of Amitraz on Urine Output (Table 10)

Out of 50 patients, 18 (36%)patients had polyuria followed by 32 (64%) patients had normal urine output. Present study correlates with following studies:

Sezgin Ulukaya et al[11] in their study of 5 cases, polyuria was present in 3 (60%) patient. 2(40%) patients presented with normal urine outputThe stimulation of α2 adrenergic receptor decreases the production of antidiuretic hormone and renin secretion. This inhibition of antidiuretic hormone leads to enhanced diuresis.

Effect of Amitraz on Blood Sugar Level (Table 11)

In present study of 50 amitraz poisoning 36 (72%) patients were having hyperglycemia. The left out 14 (28%) patients were having normal blood sugar levels. Our study correlates with following studies:

Avsarogullari L et al[10] in their study of 23 patients, mentioned hyperglycemia in 14(60.86%) patients. Normal blood sugar was present in 9(39.13%) patients. The reason for hyperglycemia in these patients is, α2 adrenergic receptor stimulation. Which ultimately reduces insulin secretion.

Effect of Amitraz on Urine Sugar Level (Table 12)

In present study of 50 cases 36 (72%) patients were having glycosuria and the remaining 14 (28%) patients were having normal urine findings. Present study correlates with following stuides:

Hasan et al[12] in their study reported 3 (42.85%) cases were having glycosuria. The remaining 4 (57.14%) cases were having nil urine sugar.

Glycosuria was present in all those patients who had hyperglycemia suggesting it was secondary to raised serum blood sugar.

Distribution of Patients According to Management (Table 14)

In present study 4 (08%) patients were treated with ventilatory support. The remaining 46 (92%) patients were treated with supportive measures. Present study correlates with following studies:

Veale DJ et al[14] mentioned, in their study of 15.26% patients were treated with ventilatory support. The remaining 84.74% were treated with supportive measures.

Presence of respiratory distress and inability to maintain oxygen saturation were the indications for ventilatory support in present study. These patients were gradually weaned from ventilator and they recovered completely.

Treatment and Outcome

The main approach while treating the patients of amitraz intoxication includes hemodynamic stabilization by proper hydration, maintaining airway, oxygen administration, reduce absorption of poison and measure to improve elimination of the toxin from the body. In decontamination, although the effects of activated charcoal have not been studied, but may still be considered for treatment.[23] Nasogastric aspiration of the stomach contents should be done. Patient with respiratory distress can be treated with ventilatory support.

As there is no specific antidote for amitraz poisoning the medical management is essentially symptomatic and supportive.[13] In spite of the severe life threatening clinical features, all cases may recover completely. In present study we would like to emphasize that the incidence of amitraz intoxication is day by day increasing due to its worldwide use in veterinary medicine. In order to decrease the incidence of amitraz poisoning, public health education should be given as primary prevention of poisoning and besides, drug producing company should redesign containers to prevent intoxication in children.

Duration of Hospital Stay (Table 15)

In present study maximum duration for which patients stayed in hospital was 6 days and they were (4 (08%) patients.

Ertekin V et al9 mentioned that, in their study of 21 cases of acute amitraz poisoning, the maximum duration of hospital stay was 5 days and minimum duration of hospital stay was 1 day.

Conclusion

Vomiting and nausea were the commonest symptoms. Hyperglycemia and glycosuria was commonest sign. There was good response to supportive treatment. There was no complication and no mortality

References

1. Wax PM. Goldfrank's Toxicologic Emergencies. 9th ed. Historical Principles And Perspectives. 2011. 1-17 p.
2. Panda BB, Hansda MK, Mishra K. Original Research Paper Study of Poisoning Cases in an Indian Tertiary Care Teaching Hospital. *Indian Acad Forensic Med* 2015; 37:165–8.
3. Proudfoot AT, Antagonist A. Poisoning with Amitraz Concepts found in this article concepts visually. *Toxicol Rev Springer* 2012; 22:71–4.
4. Dureja JBP. Amitraz:an unusual poisoning. *An Int J Anasthesiol Pain Intensive Care* 2015; 18:46–8.
5. Harrison IR, Palmer BH, Weighton DM. Group of pesticides. 2015; 4–5.
6. HL Yilmaz DRY. Amitraz poisoning, an emerging problem: epidemiology, clinical features, management, and preventive strategies. *BMJ Case Rep* 2003; 130–5.
7. Ellenhorn MJ, Schonwald S. Ellenhorn's Medical Toxicology : Diagnosis and Treatment of Human Poisoning, 2nd ed. 2015;10–1.
8. Yim GK, Holsapple MPWUR. H synthesis inhbited by formamidine psticides. *Amitraz* 2015; 1–10.
9 Ertekin V, Alp H, Selimoglu M. Amitraz Poisoning in Children:Retrospective Analysis of 21 Cases. *J Int Med Res [Internet]* 2002; 30:203–5. Availablefrom:http://imr.sagepub.com/content/30/2/203.short
10. Avsarogul l ari L, Iki zcel i l, Sungur M. 2006; 44:1923. Acute amitraz poisoning in adults : clinical features, laboratory findings, and management. 2015; 44:2015.
11 Ulukaya S, Kubilay DAM. Acute amitraz intoxication in human. *Intensive Care Med* 2001; 27:990–923.
12. Hasan AÃ, Calkavur ÖSÖ, Uzun H. Amitraz Poisoning : Clinical and Laboratory Findings. *Indian Pediatr* 2003; 41:482–3.
13. Shitole DG, Kulkarni RS, Sathe SS. Amitraz Poisoning – An Unusual Pesticide Poisoning. *J Assoc Physicians India [Internet]* 2010; 58:317–9. Available from: http://www.ncbi.nlm.nih.gov/pubmed/21117352
14. Dj Vealae, Ca W, Gj M. Amitraz poisoning in South Africa : a two year survey (2008 2009). *Clin Toxicol* 2011; 49:40–4.
15. Wh H, Tj K. Effect of amitraz and chlordimeform on heart rate and pupil diameter in rats : mediated by alpha 2 adrenoreceptors. *PubMed Commons* 2015; 73:1–2.