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Case Report

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GLYPHOSATE POISONING: A CASE REPORT

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ABSTRACT

Glyphosate herbicide has been considered minimally toxic to human. But, there are cases of severe systemic toxicity. Severe poisoning is associated with acute gastroenteritis, acute respiratory distress, acute renal failure and death. Respiratory and renal failures are causes for mortality in most of cases. A 30 year old male patient was admitted to emergency department with consumption of 200 ml of glyphosate herbicide poison followed by three episodes of vomiting. On Clinical examination patient was conscious responsive to verbal commands, vitals were normal, Glasgow Coma Scale score was 15/15 and pupils were mid dilated sluggishly reactive. The remaining physical examination was normal. Gastric lavage was done. On second day of admission patient had severe respiratory distress, Glasgow Coma Scale 4/15, and patient was kept on mechanical ventilation. The arterial blood gas analysis showed metabolic acidosis and serum creatinine was 9.2 mg/dl. Seven cycles of hemodialysis were done and during hospital stay in two weeks, the renal functions gradually improved and serum creatinine was 2.2 mg/dl. The patient was weaned of mechanical ventilation, extubated and was discharged. Early recognition of complications and treatment in glyphosate poison will improve the outcome.

KEYWORDS: Glyphosate, Herbicide, Hemodialysis.

INTRODUCTION

Glyphosate herbicide, one of the commonly used herbicide worldwide, has been considered minimally toxic to human. But, there are cases of severe systemic toxicity. Severe poisoning is associated with acute gastroenteritis, acute respiratory distress, acute renal failure and death. Respiratory failure, renal failure and cardiac arrhythmias are causes for mortality in most of cases. There is no antidote for this poisoning.[1] Therefore hemodialysis has been used to treat patients with glyphosate poisoning who develop hyperkalemia and metabolic acidosis. This case is reported to increase awareness of fatal complications in patients with severe glyphosate poisoning.

CASE REPORT:

A 30 year old male patient was admitted to emergency department with history of consumption of about 200 ml of glyphosate herbicide poison, two hours prior to admission, followed by three episodes of vomiting which contain ingested food particles. On clinical examination patient was conscious responding to verbal commands, pulse rate: 90 beats per minute, blood pressure: 110/70 mm of Hg, respiratory rate 14 cycles per minute, Glasgow Coma Scale 15/15, pupils mid dilated sluggishly reactive. The remaining physical examination was normal. Gastric lavage was done and aspirate sent to poison detection centre, where it was confirmed to be glyphosate poison compound. During hospital stay on second day, patient's consciousness was deteriorating and was not responsive to painful stimuli. Clinical examination revealed heart rate of 120 beats per minute, blood pressure of 100/70 mmHg, respiratory rate of 30 cycles per minute, oxygen saturation of 50% with ten liters oxygen inhalation by mask and Glasgow Coma Scale score of 4/15. On auscultation bilateral coarse crepitations were heard. The remaining physical examination did not reveal significant findings. Urine output was reduced. Biochemical parameters as depicted in (Table.1) showed serum creatinine of 9.7 mg/dl, blood urea of 95 mg/dl.

Table 1: Serial biochemical analysis.

Parameter	Day 1	Day 2	Day 3	Day 5	Day 7	Day 9	Day 12	Day 14
Serumcreatinine (mg/dl)	1.6	9.7	7.7	11.5	9.0	6.0	3.1	2.2
Blood urea (mg/dl)	40	95	80	92	85	60	52	40
Serum sodium (mmol/l)	138	150	147	147	145	140	136	138
Serum potassium(mmol/l)	4.0	4.2	3.6	4.7	4.2	4.0	3.6	3.0

The arterial blood gas analysis as depicted in (Table.2) showed metabolic acidosis. In view of respiratory failure patient was intubated and mechanically ventilated. In view of acute renal failure and severe metabolic acidosis haemodialysis was done and subsequently seven cycles of hemodialysis. During this period the urine output improved from 100 ml/day to 3500 ml/day.

Table 2: Serial arterial blood gas analysis

Parameter	Day 1	Day 2	Day 3	Day 5	Day 7	Day 9
P^H	7.20	7.42	7.51	7.37	7.43	7.50
PCO_2 (mm of hg)	36.7	45.7	34.1	38.2	36.5	35
PO_2 (mm of hg)	59	168	172	148	122	130
TCO_2 (mm of hg)	15	21.6	25.5	20.5	22	24
HCO_3 (mmol/l)	17.2	23.2	27.2	21.6	23.8	22
Becf (mmol/l)	11	07	14.1	2.8	06	01
SBC (mmol/l)	18	24	28.3	22	25	21.5

On third day the patient had two episodes of generalized tonic clonic seizures for which the patient was treated with intravenous Phenytoin Sodium 100 mg thrice daily, Sodium Valproate 500 mg twice daily and patient had no further episode of seizure. Over the next seven days stay in the hospital patient consciousness level improved and responding to verbal commands. Clinical examination revealed pulse rate of 80 beats per minute, blood pressure of 120/80 mm of Hg, respiratory rate of 15 cycles per minute, temperature of 37^0celsius, Glasgow Coma Scale score of 13/15, remaining physical examination was normal. The patient was slowly weaned off ventilation on ninth day and extubated. Patient condition was uneventful since then; hence patient was discharged on day 14. Follow up after 2 weeks patient was normal.

DISCUSSION

Glyphosate is most widely used herbicide in agriculture, forestry, industrial weed control, lawn, garden and aquatic environment.[2] It is a nonselective herbicide. It contains carbon and phosphorous moiety, but has no anticholinesterase effect and does not demonstrate organophosphate-like effects. The formulation most commonly available contains water, 41% glyphosate (isopropylamine salt) and 15% polyoxyethyleneamine (POEA).[3] The toxicokinetics of glyphosate alone in humans is not well established, and most of what is known has been derived from animal studies. On ingestion, glyphosate is initially distributed to the small intestine, colon, kidney, and bone. Glyphosate's mode of action is to inhibit an enzyme involved in the synthesis of the aromatic amino acids tyrosine, tryptophan and phenylalanine through shikimic acid pathway. In human toxicity is less due to absence of shikmic acid pathway. Mechanism of glyphosate toxicity to human is by uncoupling of oxidative phosphorylation.[4] The majority is rapidly excreted without bio-transformation in the feces and secondarily in the urine. Gastrointestinal symptoms are most common manifestations after oral ingestion. Dermal exposure may lead to skin and eye irritation. Severe poisoning causes dehydration, hypotension, pneumonitis, oliguria, hepatic dysfunction, acidosis, hyperkalemia, dysrrhythmias.[5] The complications after ingestion are determined by volume of surfactant ingested. In a study by Soek et al., complications after ingestion of more than 8ml of undiluted surfactant was hypotension(47.1%), mental deterioration(38.6%), respiratory failure (30%), acute renal failure(17.1%), arrhythmias (10%).[6] Patients developing acute renal failure, hyperkalemia, pulmonary edema are most likely to die.[7] Our patient developed respiratory failure, hyperkalemia, acute renal failure where early intensive care, recognition of complications and aggressive supportive treatment along with hemodialysis improved the outcome. Severe complications in our patient may be due to large volume of consumption. There is no specific antidote for glyphosate poisoning. Mainstay of treatment is supportive care. Early hemodialysis may improve the prognosis. The effects of dialysis were improvement of hemodynamic status and correction of electrolyte imbalance related to renal failure.

CONCLUSION

Though toxicity in the humans is minimal, fatal complications have been identified and reported. Observation of patient, early recognition of complications like renal failure respiratory failure and arrhythmias and treatment in glyphosate poison will improve the outcome, as there is no specific antidote and treatment.

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REFERENCES

1. Mahendrakar K, Venkategowda PM, Rao SM, et al. Glyphosate surfactant herbicide poisoning and management. Indian J Crit Care Med., 2014; 18: 328-30.
2. Giesey JP, Dobson S, Solomon KR. Ecotoxicological risk assessment for roundup

herbicide. Rev Environ Contam Toxicol, 2000; 167: 35-120.
3. Venugopal K, Suresh C, Vishwanath H, et al. Glyphosate: Surfactant Herbicide Poisoning- Is it mild? Med J DY Patil Univ, 2015; 8: 816-18.
4. Bates N, Campbell A. Glyphosate. In: Campbell A, editor. Handbook of Poisoning in Dogs and Cat. 1st ed. England: Blackwell Science Ltd., 2000; 135-8.
5. Darshana Sudhip Thakur, Rajashree Khot, P.P.Joshi, et al. Glyphosate Poisoning with Acute Pulmonary Edema. Toxicol Int., 2014; 21: 328-30.
6. Seok SJ, Park JS, Hong JR, et al. Surfactant volume is an essential element in human toxicity in acute glyphosate herbicide intoxication. Clin Toxicol (Phila), 2011; 49: 892–99.
7. Darren M Roberts, Nick A Backley, Famid Mohamed, et al. A prospective observational study of the clinical toxicology of glyphosate-containing herbicides in adults with acute self poisoning. Clin Toxicol (Phila), 2010; 48: 129–36.