

## Successful therapeutic management of acute organophosphate poisoning in horse: A case report

Shubhasini Dhuriya\*, Arpan Chauhan, Shveta Singh, Manu Jaiswal, A.K. Tripathi

Department of Veterinary Medicine, CVSc & AH, Pt. Deen Dayal Upadhyay Pashu Chikitsa Vigyan Vishwavidyalayevam Go Anusandhan Sansthan (DUVASU), Mathura- 281001 (UP)

### Abstract

A four years old male horse was presented to the TVCC, DUVASU Mathura, suffering from acute insecticide (organophosphate) poisoning from one-day. According to the owner, the horse was accidentally exposed and grazed on field where organophosphate insecticide was used on that day and consumes a lot of fodder. Acute clinical signs develop after 4-5 hours of grass ingestion. Clinical manifestations observed as fever, salivation, nasal discharge with respiratory distress and restlessness. Based on history and clinical signs, the case was diagnosed as organophosphate poisoning and immediately treated with inj. Atropine @0.04mg/kg b.w. IV, inj. Flunixin Meglumine @1.1mg /kg b.w. IV for three days, Charcoal@300ml orally, inj. Ampicillin&Cloxacillin @10mg/ kg b. w. IM, inj. Tribivet @15 ml IM, inj. Furosemide (RIDEMA)@10 ml IM, and aggressive fluid therapy including RL and DNS @40ml/kg BW for three days. The animal was continuously monitored on the 3rd, 7th, and 15th days after treatment with successful recovery. The horse was in healthy appearance after one month of follow up schedule with regular intake of food and water.

**Key word:** Horse, Insecticide, Poisoning, Atropine

Organophosphate (OP) compounds are widely used in agriculture to control pests, weeds, or plant diseases and many of these products are highly hazardous and lack species selectivity (Sumathi *et al.*, 2014). In equines poisoning occur through ingestion of toxic forage, baits, pesticides, improperly stored grain and hay, drugs, and medications given in an overdose or by an improper route, barn, and stable cleaning compounds, paint, and other toxic substances. Symptoms are lack of coordination, hyper excitability, tremors, seizures, respiratory depression, and collapse. Death may occur in a very short period if the symptoms are not recognized and prompt first aid treatment initiated. Consumption of contaminated feed (mistaken addition of insecticide to feeds or recently treated crop) or access to incorrectly stored insecticides is the most common causes of poisoning in horses (Nagy *et al.*, 2019).

### Case History and Observations

A four year old male horse was presented to the TVCC, DUVASU Mathura, suffering from acute insecticide (organophosphate) poisoning since one-day. According to the owner, the horse was accidentally exposed and grazed on field where insecticide was used on the day and consumes a lot of fodder. Clinical signs

develop after 4-5 hours of grass ingestion. On clinical examination fever (103°F), frothy nasal discharge (slightly yellowish in colour) respiratory distress with abnormal sound, salivation, lacrimation and restlessness was found with mild degree colic signs.

Based on history and clinical examination findings, the case was diagnosed as organophosphate poisoning and immediately treated with antidote with some supportive medications. Therapy started with inj. Atropine @ 0.04mg/kg b.w. IV, inj. Flunixin meglumine @1.1mg /kg b.w. IV for three days, Charcoal (kaolin ) @300ml orally, inj. Ampicillin & Cloxacillin @10mg/kg b. w. IM, inj. Tribivet @15 ml IM, inj. Furosemide (RIDEMA )@10 ml IM, and aggressive fluid therapy including RL and DNS @40ml/kg BW for three days. The animal was continuously monitored on the 3rd, 7th, and 15th day post treatment. Animal was clinically recovered from all symptoms of poisoning related to respiratory, gastrointestinal and mainly. Normal intake of feed, defecation and urination was also recorded. After fifteen days of follow-up schedule, animal was surviving healthy life.

The following images show the clinical symptoms of poisoning at 0<sup>th</sup> day (pretreatment and 3<sup>rd</sup> day (post treatment) of therapy.

\*Corresponding author: dhuriyashubhasini10@gmail.com

### Pre - treatment (on 0<sup>th</sup> day)



Fig. 1. Frothy nasal discharge with excessive salivation and increase respiration rate due to acute poisoning

### Post - treatment (on 3<sup>th</sup> day)



Fig. 2. Normal respiration pattern without any discharge after three days of therapy



Fig. 3. Horse clinically recovered from all symptoms of poisoning and having normal respiration rate, feed intake, urination and defecation after seven days of therapy.

### Discussion

On the basis of present case history, horse severally expresses the sign and symptom of organophosphate toxicity and completely recovered 3 days of post therapy. All physiological parameters comes to normal in healthy state. Atropine given as antidote of organophosphate toxicity. A compound that extensively used in agriculture and industry for controlling pests of crops. Organophosphate compounds bind irreversibly to acetyl cholinesterase in the plasma, Red cell, and cholinergic synapses in CNS and PNS and symptoms produced due to activation of excessive muscarinic receptor. Reduced cell or plasma cholinesterase activity indicates OP exposure. AChE activity, less than 50% indicates exposure to one of these insecticides, and less than 25% of normal indicates toxicities from one of these insecticides (Fukuto,1990). Organophosphate compounds inhibit AChE via covalent binding to the serine hydroxyl group in the enzyme active site. This blockage results in the accumulation of the NTs acetylcholine in the synaptic cleft, which in turn leads to saturation of cholinergic receptors and an inability to control the muscles involved in breathing, leading to asphyxiation, paralysis, and eventually death (Katz *et al.*, 2018). Atropine is a drug of choice because it acts on central and peripheral cholinergic receptors. Acute clinical signs produce due to muscarinic, nicotinic, and central receptor effects. Muscarinic cholinergic stimulation result as the “SLUD” signs (increased salivation, lacrimation, urination, and defecation) and bronchorrhea.

Nicotinic and acute central symptoms include muscle weakness contributing to respiratory distress, confusion, and convulsions, further compromising the airway, and increasing aspiration risk causing hypoxia. Symptoms occur early in OP poisoning, which can be rapidly reversed by atropine therapy because it slows down intestinal transit time and prolongs OP toxicity. Persistence of the Organophosphate in the Gut lumen observes after 10day poisoning (Martinez Chuecos *et al.*, 1992). Each compound also has unique characteristics and outcomes (Eddleston *et al.*, 2005). Pralidoxime chloride (2-PAM) is the true antidote that regenerates AChE. It controls the nicotinic signs and works best when combined with atropine treatment. So Clinical presentation and severity of poisoning depends not only on the toxicological and toxicokinetic properties of the poison, but also on the quantum of poison, the route of exposure, co-ingestions, and patient characteristics.

An accurate diagnosis of poisoning requires a systematic approach, beginning with a comprehensive history, followed by clinical examination of affected horses, clinical pathologic testing, postmortem examinations, and analytical toxicology testing (Wickstrom and Blakley, 2002).

## References

- Eddleston M, Eyer P, Worek F, Mohamed F, Senarathna L, von Meyer L, *et al.* 2005. Differences between organophosphorus insecticides in human selfpoisoning: A prospective cohort study. *Lancet*; **366**: 14529.
- Fukuto TR. 1990. Mechanism of action of organophosphorus and carbamate insecticides. *Environmental health perspectives*. **87**:245-54.
- Katz FS, Pecic S, Schneider L, Zhu Z, Hastings-Robinson A, Luzac M, Macdonald J, Landry DW, Stojanovic MN. 2018. New therapeutic approaches and novel alternatives for organophosphate toxicity. *Toxicology letters* **1**; 291:1-0.
- MartinezChuecos J, del Carmen Jurado M, Paz Gimenez M, Martinez D, Menendez M. 1992. Experience with hemoperfusion for organophosphate poisoning. *Crit Care Med*; **20**:153843.
- Nagy AL, Cortinovic C, Spicer LJ, Perego MC, Caloni F. 2019. Long-established and emerging pesticide poisoning in horses. *Equine Veterinary Education*. **(9)**:496-500.
- Sumathi ME, Kumar SH, Shashidhar KN, Takkalaki N. 2014. Prognostic significance of various biochemical parameters in acute organophosphorus poisoning. *Toxicology international*. **21(2)**:167.
- Wickstrom M, Blakley B. 2002. Equine toxicoses: investigative strategies and approaches for performance horses. *Clinical Techniques in Equine Practice*. **1**; **1(2)**:53-7.

*Received : 13.12.2022*

*Accepted : 16.06.2023*