

Organophosphorus compound poisoning in newborn

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Abstract

Poisoning is a diagnosis seldom made in neonatal intensive care units as most clinical features such as lethargy, respiratory distress, and poor feeding mimic common neonatal conditions. An 8-day-old male baby presented with complaints of inconsolable crying, poor feeding, and seizures for 1 day. On admission, he had bradycardia, copious secretions and pin-point pupils, which led to suspicion of cholinergic over-activity. Cholinesterase levels were 2209 IU/L in baby which increased to 5936 IU/L on day 18 of life. There was a history of charred vasambu (*Acorus calamus*) being applied over the tongue. Contamination of vasambu with organophosphates was suspected which was confirmed by high performance thin layer chromatography analysis showing chlorpyrifos derivatives. Baby improved gradually with supportive treatment and was discharged on day 18 of life.

Key words: Breastfeeding, Neonate, Organophosphorus, Poisoning

Poisoning is a diagnosis which is seldom made in a neonatal intensive care unit as most of the poisons especially organophosphates (OP) present with clinical features such as lethargy, poor feeding, copious secretions, respiratory distress, diarrhea, jitteriness, and seizures; however, these features commonly led to the diagnosis of sepsis. Since sepsis is the most common cause of admissions [1] and death [2] in the newborn period, especially in a country like India, hence it requires extreme alertness, extensive history taking and high suspicion to diagnose a case of poisoning. Very few cases of poisoning in newborn period have been reported in literature [3-5]. We report case of OP poisoning in a newborn.

CASE REPORT

An 8-day-old male baby admitted with complaints of inconsolable crying, poor feeding, and seizures for 1 day. He was born to 26-year-old primigravida mother at term by spontaneous vaginal delivery. Antenatal and intra-partum periods were uneventful. He was referred to our hospital as a case of late onset sepsis with bronchopneumonia for further management. On examination, he had cold peripheries, mottling, bradycardia (heart rate - 90/min), and SpO₂ of 81% at room air. He had copious oral secretions and tonic posturing of limbs. Both his pupils were pin-point but other cranial nerves were normal. Treatment was started with intravenous antibiotics, intranasal oxygen, phenobarbitone, and supportive therapies.

His random blood sugar was 84 mg/dl. His septic work-up including complete blood count, platelet count, C-reactive protein, and cerebrospinal fluid (CSF) analysis was negative. Blood and CSF culture were also sterile. Chest X-ray, echocardiography, and ultrasound cranium revealed no significant anomaly. His arterial blood gas analysis, blood ammonia, and lactate levels were also normal. These investigations ruled out neonatal sepsis and meningitis, so an alternative diagnosis was thought of. In view of pin-point pupils with copious secretions and bradycardia at admission cholinergic over-activity was considered.

On further questioning, parents gave history of having applied charred vasambu (herbal medicinal plant - *Acorus calamus*) on baby's tongue. Mother also gave history of diarrhea and vomiting on the same day the baby developed symptoms. With the above history and clinical findings a strong possibility of Organophosphorus (OP) poisoning was suspected and cholinesterase levels were done which was 2209 IU/L in baby's serum and 2600 IU/L and 2939 IU/L, respectively in mother's breast milk and serum which was lower as compared to a reference value of 4659-14443 IU/L.

Baby gradually improved without being given atropine or pralidoxime probably due to the exposure to a miniscule dose. Baby's cholinesterase level at discharge on day 18 of life had increased to 5936 IU/L. The remaining vasambu pieces were tested by high performance thin layer chromatography analysis

and it was positive for chlorpyrifos derivatives [Fig. 1 and Graph 1].

DISCUSSION

OP poisoning can be fatal and requires prompt intervention for a good outcome. Very few cases of OP poisoning are reported in newborn period [3-5] and most of the cases were due to transplacental exposure due to homicidal or accidental ingestion by mothers [6-8]. A few cases have been reported following the ingestion of herbal medicine [7]. In our case, baby was given vasambu (*A. calamus*) which is a tall perennial wetland monocot. Its rhizome has medicinal value, chiefly for its effect on digestive and respiratory systems. Traditionally, a small piece is charred and ground with breast milk and applied to the tongue every morning. These plants are often sprayed with pesticides as they are prone for *Cercospora* infestation.

Children may die of OP poisoning with a dose as little as 0.1 mg/kg [9]. In the piece of vasambu analyzed in our case as per peak area obtained from chromatogram, each gram of vasambu contained 0.17 mg of malathion and 0.19 mg of chlorpyrifos [Fig. 1, Graph 1].

Clinical signs of OP poisoning go by the acronym SLUDE BBB (salivation, lacrimation, urination, defecation, emesis, bronchorrhea, bronchospasm, and bradycardia) or DUMBELS (diarrhea, diaphoresis, miosis, bronchorrhea, bronchospasm, bradycardia, emesis, lacrimation, and salivation). Central nervous system (CNS) effects may include restlessness, tremors, seizures, and CNS depression [9].

The mother who handled the baby and the baby, who ingested it, both had classical features suggestive of OP poisoning. Chlorpyrifos is a chlorinated OP and is a non-systemic insecticide effective by direct contact, ingestion and inhalation. Humans are more sensitive to chlorpyrifos compared to dogs and rats. Research has also shown that neonates are more susceptible to adverse effects from chlorpyrifos at levels below that causing cholinesterase inhibition [10].

OP poisoning can be diagnosed by demonstrating low levels of cholinesterase and pseudo-cholinesterase in the baby. Low levels in mother's milk and blood can also aid in the diagnosis [11,12] as was seen in our mother and infant. Treatment includes supportive management such as ventilation, saturation monitoring and electrocardiographic monitoring, and cardiovascular support. Specific antidotes are atropine, pralidoxime, and benzodiazepines [9].

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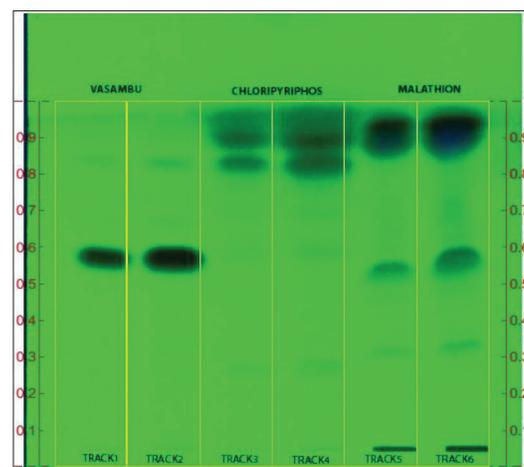
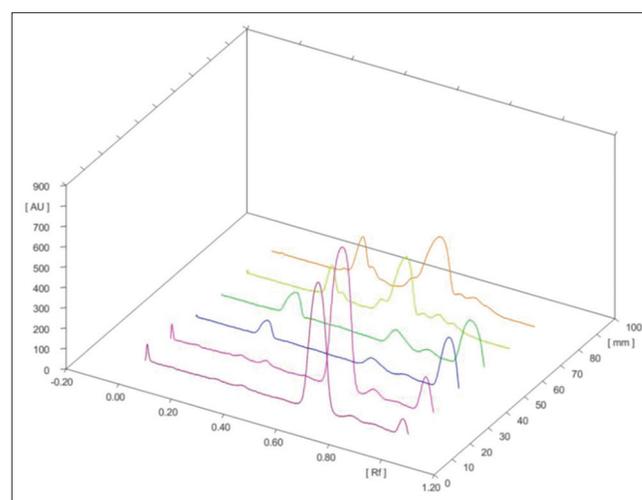


Figure 1: Thin-layer chromatography visualization at 256 nm



Graph 1: All tracks under wave scan (200-700 nm). Standard Rf value of malathion derivatives observed is 0.53 in peak 5. Likewise, in peak 4 (Rf 0.90) in chlorpyrifos matches with the vasambu sample clearly indicating the presence of chlorpyrifos derivatives. Whereas Rf value peak in vasambu is around 0.94 clearly indicates in the presence of trace amounts of the organophosphorus compounds. The slight shift in the Rf value is due to the presence of other phytoconstituents in the plant extract

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