

What Should We Do After Acute Organophosphorus Pesticide Poisoning During Pregnancy?

Keywords: Organophosphates poisoning; Fetal development; Pregnancy

Abstract

A 25-year-old married primigravida was admitted to Pingjin Hospital after ingestion of dichlorvos, with suicidal intent. The initial serum dichlorvos level was 1.7 $\mu\text{mol/L}$, with a reduction in cholinesterase activity of 29% in whole blood. Abdominal investigation revealed a soft abdomen with a pregnant uterus consistent with 9th week of gestation on echography and with a viable fetus. The patient was discharged from hospital with successful treatment of both mother and neonate after 10 days of treatment. However, we cannot confirm whether dichlorvos poisoning will affect the brain development of the fetus. Subsequently, she made an artificial abortion for fear of adverse fetal outcome four weeks later after intoxication.

Introduction

Organophosphates (OPs) are widely used insecticides, but still presents a serious health threaten. According to a report by the World Health Organization (WHO), up to 3,000,000 people worldwide are affected by pesticide poisoning each year, with acute organophosphate pesticide poisoning (AOPP) being the most common type [1]. AOPP is fairly common in rural areas of China [2]. It is seen in almost all types of population affecting both male and female. Accordingly, it can occur in women of reproductive age, including those pregnant. However, exposure to OP in pregnancy poses problems for both mother and fetus because of placental transfer of OP compounds [3].

Treatment of OPs poisoning in pregnancy and the potential developmental effects of OPs exposures to the developing fetus and child has been studied for several decades. However, these issues still have not been adequately resolved and have no satisfactory answers. One of the important questions yet to be answered is whether a healthy baby can be delivered when pregnant women with AOPP managed successful without mother and fetal death. In this paper, we described one case of AOPP during pregnancy with successful treatment of both mother and neonate. However, the mother made an artificial abortion four weeks later after intoxication because not sure whether dichlorvos poisoning will affect the brain development of the fetus.

Case Report

A 25-year-old married primigravida was admitted to the Pingjin Hospital, Affiliated Hospital of Logistics university of Chinese people's armed police force, 5 h after ingestion of dichlorvos, with suicidal intent. The initial serum dichlorvos level was 1.7 $\mu\text{mol/L}$, with a reduction in cholinesterase activity of 29% in whole blood. Quantitative analysis of the initial serum dichlorvos level was conducted in the hospital laboratory by a gas chromatography method [4]. Clinical examination revealed a fully conscious patient,

well-oriented and with mild salivation. Abdominal investigation revealed a soft abdomen with a pregnant uterus consistent with 9th week of gestation on echography and with a viable foetus. Fetal heart rate was monitored and showed no significant abnormality. Treatment included activated charcoal hemoperfusion therapy, gastric lavage, Penehyclidine hydrochloride (PHC) and pralidoxime chloride. The regimen of injection of PHC as follows: 4 mg of PHC was given intramuscular as a first dose, then 2 mg of PHC was given intramuscular every 8 h until muscarinic symptoms were relieved. It was continued until the tracheo-bronchial tree was cleared of the secretions and most secretions were dried. Then the dose was adjusted to maintain this effect until the cholinesterase activity of the whole blood increased 65%. When the first 2 intravenous injections of 1.0 g of pralidoxime chloride are not satisfactory, continuous infusion at rates up to 1 g per hour. After 5 days of treatment, the cholinesterase activity of the whole blood increased 100%. Then she was transported to the maternity ward to continue treatment. The patient was discharged from hospital with good general condition after 10 days of treatment, the fetal heart rate also showed normal. Before discharging from hospital, she wants to know that whether the fetal growth could be affected by the OP poisoning and whether a healthy baby can be delivered? However, facing these problems, we can't give him a firm answer. Then, she made an artificial abortion for fear of adverse fetal outcome four weeks later after intoxication. However, the patient refused to check for the post-abortion fetus, we could not get any medical information of the fetus.

Discussion

Whether a healthy baby can be delivered when pregnant women with AOPP managed successful without mother and fetal death is still a matter of debate. The key determinant of the answer is whether prenatal OP exposure can affect fetal development. Epidemiologic studies in humans on the subject have shown conflicting results [5-8]. However, these conflicting results are about the effect of low OP



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exposure upon birth weight, length and head circumference of the infants.

OPs are well-known acute neurotoxicants, which inhibit acetylcholinesterase, resulting in the buildup of acetylcholine in neuronal junctions [9]. Ecologic studies have implicated a link between pesticide exposure and impaired neurodevelopment [10,11]. Developmental neurotoxicity studies have also been shown that prenatal exposure to OP pesticides may be associated with an increased risk of pervasive developmental disorders, delays in cognitive development and attentional deficits [12-14]. These developmental neurotoxicity also associated with the level of OP pesticide which prenatal and early childhood exposure to [15]. These studies suggest that prenatal exposure to OPs may disrupt brain development in the developing nervous system.

Furthermore, numerous studies were conducted in animals to evaluate the potential effect of OPs exposures, including on neurologic development. Experiments indicate that young animals being more sensitive to the effects of OPs exposure [16,17]. Therefore, animals' in utero experiencing OPs exposure may decrease balance [18], increase righting reflex time and poorer cliff avoidance [19].

However, reviewed human of literature suggests that the majority of the pregnant women, who survived the acute phase of AOPP, had an uneventful pregnancy and had a good fetal outcome. Table 1 summarizes the study characteristics of case reports [20-26]; Table 2 summarizes the study characteristics of K. Adhikari [27]. As can

be seen from these clinical data, the poisoning cases occurred in different stage of pregnancy and the majority of the women who survived the acute phase of poisoning had an uneventful pregnancy and had a good fetal outcome. With all the clinical data available up to now, it looks like that AOPP did not change the course of pregnancy nor did it damage the fetus. However, the study population was small and the severity of most poisoning cases is unclear. Especially in some cases, the types and classes of OPs are unclear. Furthermore, the instruments used to assess the outcomes of neonates are just Apgar score and weight, long-term follow-up of neonates was also lacking in all study population.

Facing these diverse outcomes, it is difficult to draw any final and firm conclusion from these studies. However, what should we do after AOPP during pregnancy? Perhaps the best way is to establish an international register (e.g. through WHO or Poison Center/Organisation) in which all exposures (accidental and intentional) can be recorded. And long-term follow-up of neonates of human are required to find out whether a healthy baby can be delivered after AOPP during pregnancy. This will allow a more detailed and complete database from which advice can be retrieved.

Ethical Statement

The patient was given written information and a verbal explanation concerning the study prior to obtaining the written informed consent for his participation. Prior to commencement of the study, the patient was fully informed and signed an informed consent document.

Table 1: Case reports of AOPP during pregnant

Author	Case	OP	Week of gestation	Age of mother	Prognosis of fetus	Prognosis of mother	Cause of death of fetus	Apgar score of fetus at 1minute	Weight of fetus
Solomon GM	1	Chlorpyrifos	29 th	22 y	death	Survived	prematurity	6	1.2 kg
Karalliedde L	1	Methamidophos	36 th	22 y	healthy			10	2.85 kg
Karalliedde L	1	Fenthion	16 th	25 y	healthy			10	3.83 kg
Weis OF	1	Unclear	35 th	21 y	healthy			3	1.86 kg
Kamha AA	1	Diazinon	26 th	42 y	healthy			9	2.944 kg
Sebe A	1	Chlorpyrifos	19 th	23 y	death	Survived	delay in therapy		
Jajoo M	1	Diazinon		50 hours before delivery	none			3	2.52 kg
Carringtonda Costa RB	1	Metasystox R	20 th	41 y	healthy			10	3.35 kg

Table 2: Patient profile and outcome of pregnancy of K. Adhikari's report

	Week of gestation	Age of mother	Prognosis of fetus	Prognosis of mother	The cause of death	Weight of fetus or mother
1	18 th	23 y	healthy	Survived		2.6 kg
2	14 th	19 y	healthy	Survived		2.9 kg
3	28 th	32 y	healthy	Survived		2.8 kg
4	32 th	24 y	healthy	Survived		3 kg
5	10 th	18 y	death	death	Acute stage of poisoning	
6	24 th	20 y	healthy	Survived		2.4 kg
7	22 th	24 y	healthy	Survived		2.6 kg

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