ORGANOPHOSPHATE FOOD POISONING IN A FAMILY IN MUKIM RANTAU, NEGERI SEMBILAN

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ABSTRACT

Organophosphates are used in large quantities around the world as agricultural pesticides. They are well documented as a cause of acute poisoning in humans including suicidal ingestion, occupational exposure and unintentional exposure through inhalation, skin absorption and ingestion. This is a report of an incident of organophosphate food poisoning in a family residing in Mukim Rantau, Negeri Sembilan. The victims (three males and one female) were aged between 32 to 60 years old. All suffered from symptoms of severe acute food poisoning such as nausea, vomiting, diarrhoea, sweating, confusion, headache, difficulty in breathing and muscle weakness ajier taking their dinner. The female victim died one hour ajier developing symptoms. The other three were admitted to the hospital. Investigation revealed 'fried lady's fingers' as a suspected source with possibility of cross contamination occurring during preparation of the meal. The suspected chemical substance was pesticide containing organophosphate, based on classical symptoms and signs of acute organophosphate poisoning, severe low levels of serum cholinesterase, good response to treatment with intravenous atropine, evidence of pesticide use in the patients' plantation, and post mortem results of organophosphate substance in the deceased's stomach content.

Key words: Organophosphate food poisoning, pesticides, cross-contamination

INTRODUCTION

Organophosphates pesticides are used extensively worldwide, and poisoning by these agents, particularly in developing nations, is a serious public health problem. It is used in large quantities around the world as agricultural pesticides. Organophosphates are well documented as a cause of acute poisoning in humans in a variety of situations including suicidal ingestion, occupational exposure and unintentional exposure through inhalation, skin absorption and ingestion (Kwong 2002) . In developing countries, the widespread use of organophosphates has been accompanied by an appreciable increase in the incidence of poisoning with these agents. This is a result of their easy availability, indiscriminate handling and storage and the lack of knowledge about the serious consequences of poisoning (Chaudhry 1998). Food poisoning caused by organophosphates in food is seldom reported in the literature although organophosphates represent an important cause of potentially reversible food-borne illness. A few cases have been reported; one of the biggest episodes of organophosphate food poisoning involved 60 people resulting in one death in India in 1997. The victim's plates were accidentally sprayed with malathion, an organophosphate before the communal lunch (Chaudhry 1998). In Malaysia, Sirajuddin et al (2002) reported that the percentage of organophosphate poisoning was second highest after paraquat poisoning in Malaysia in year 2000 (Sirajuddin 2002). However, there are not many reports or data on this chemical poisoning in Malaysia. This is a report of organophosphate food poisoning occurring in a family from a village in Mukim Rantau, Negeri Sembilan.

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CASE PRESENTATION

A suspected chemical food poisoning was reported to the Seremban District Health Office on 26 August 2003. It involved a family (a mother and 3 sons) from a village in Mukim Rantau, Negeri Sembilan. The mother was 60 years old, and the sons were aged 32, 33 and 40 years old. All of them took dinner between 8.00pm to 8.30pm on 25 August 2003. The food prepared was pig belly soup, fried lady's fingers and Chinese cabbage by the mother that night. After one hour, all of them presented with severe nausea, vomiting, abdominal cramps, diarrhoea, profuse sweating followed by headache, muscle weakness, difficulty in breathing and confusion. The mother died after one hour. Only the father did not show any symptoms. The three sons were admitted to the state government hospital.

Following the report of suspected food poisoning, an investigation team from the Seremban District Health Office was sent to the victims' house. There were five members in the

family (father, mother and three sons). They lived in a wooden house, and used water from pipes and a well. They worked as farmers, planting fruits and vegetables such as guava, brinjal and red chillies. Pesticides were used in their plantation. The investigation team also found a medium sized store where a stove was used for cooking. Some empty containers of pesticides were found inside and outside the store. Some of these pesticides were kept together with cooking utensils in the kitchen.

Samples were collected from the food taken at dinner (pig belly soup, fried lady's fingers and Chinese cabbage). Samples of brinjal, guava and red chillies were taken from the plantation site and samples of fresh lady's fingers were taken from the wet market nearby. Swabs from the cooking utensils in the victims' home were taken. Water samples from the well were also taken. All samples were analysed in a national laboratory in Selangor.

CASE FINDINGS

From the epidemiological investigation, all victims ate pig belly soup, fried lady's fingers and Chinese cabbage. According to the father, he was the only one who did not eat the 'fried lady's fingers'. Therefore, the attributable risk for 'fried lady's fingers' was 100%. The initial onset was at 9.30 pm (1 case) and the last onset was at 10.30 pm (3 cases). The incubation period was 1 hour to 2 hour 30 minutes.

Serum cholinesterase was tested in three of the victims during the time of admission and 6 hours later. Results showed very low levels of serum cholinesterase at the time of admission (ranging from 2562 to 2913 IU/L) and a slight increase 6 hours later after administration of intravenous atropine (ranging from 3224 to 3597 IU/L) (normal levels of serum cholinesterase is from 7000 to19000 IU/L). The most significant evidence was based on the post mortem findings, where organophosphate was found in the stomach contents of the victim.

The laboratory results showed that there was malathion (organophosphates) in the brinjals (0.02 mg/kg), red chillies (0.15 mg/kg) and guava (0.02 g/kg). The red chillies and guava also contained dimethoate (0.09 mg/kg) and (0.05 mg/kg) respectively. Surprisingly, the 'fried lady's fingers' which was the most suspected contaminated food had no trace of organophosphate. However, it was suspected that cross-contamination could have occurred during preparation of the meal from the cooking utensils or environment (where the pesticides were stored together with the food and cooking utensils).

DICUSSION

The cause of the chemical food poisoning was pesticide-containing organophosphates. The diagnosis of acute food poisoning due to organophosphates was made, based on the classical signs and symptoms of acute organophosphate poisoning, the short incubation period of less than one hour, very low levels of serum cholinesterase, and post mortem findings of organophosphates in the stomach contents of the victim. The 'fried lady's fingers' which was the most suspected contaminated food did not contain any trace of organophosphates. However, this was the only food which was not consumed by the father (the only family member not affected by the organophosphate poisoning).

The signs and symptoms of food poisoning such as nausea, vomiting, abdominal pain, diarrhoea, profuse sweating, muscle weakness, difficulty in breathing and confusion suffered by the victims were classical signs of an acute organophosphate poisoning. The organophosphates are powerful inhibitions of acetyl cholinesterase, and as a result this enzyme inhibition, the substrate acetylcholine accumulates. The continued stimulation and eventual paralysis of the acetylcholine receptors account for the clinical signs and symptoms of organophosphate poisoning, including of muscarinic, nicotinic, and central nervous effects (Kwong 2002). Organophosphates also result in low levels of serum cholinesterase and these levels were also low in the three victims who survived.

The three victims recovered fully after being administrated intravenous atropine in the hospital. Atropine is a well known antidote for organophosphate poisoning (Kwong 2002); and this further supports the diagnosis of organophosphates poisoning. The most significant evidence was the presence of organophosphates in the stomach content of the deceased. In addition, there were no other reports of organophosphate food poisoning from the government or private healthcare facilities nearby. Samples taken from the wet market where the victims bought the foods were negative for organophosphates.

The suspected method of contamination in this case was due to improper storage of pesticides with food and cooking utensils in the victims' kitchen. According to Langford & Ferner (2002), contamination can occur during transport or storage, ingestion of seed dressed for sowing, accidental addition of pesticide to food and food contaminated by pesticide misuse (Langford 2002).

The reasons why only one victim (the mother) succumbed to the poisoning could be due to the possibility of high dose of

organophosphate ingestion. This condition was probably worsened by electrolyte imbalance and severe dehydration due to severe vomiting and diarrhoea as well as the victim's age compared to her much younger sons.

CONCLUSION

The increasing and indiscriminate use of organophosphates as agricultural and household insecticides without any accompanying public education about their storage and safe use increases the potential for more outbreaks of food poisoning. There is a need for public information via campaigns on pesticide usage as well as legislative control of organophosphate pesticides in order to avoid further poisoning incidents and fatalities.

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