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Original communication

Pesticide poisoning trend analysis of 13 years: A retrospective study based on telephone calls at the National Poisons Information Centre, All India Institute of Medical Sciences, New Delhi

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ABSTRACT

The study was designed to analyze the incidence and pattern of pesticide poisoning calls reported to the National Poisons Information Centre (NPIC), AIIMS, New Delhi and highlight the common classes of pesticides involved in poisoning. The telephone calls received by the Centre during the thirteen year period (1999–2012) were entered into a preset proforma and then into a retrievable database. A total of 4929 calls of pesticide poisoning were recorded. The data was analyzed with respect to age, gender, mode and type of poisoning. The age ranged from 1 to 65 years with the preponderance of males (M = 62.19%, F = 37.80%). The age group mainly involved in poisoning was 18–35 years. While 59.38% calls pertained to household pesticides, 40.61% calls related to agricultural pesticides. The common mode of poisoning was intentional (64.60%) followed by accidental (34.40%) and unknown (1%). Amongst the household pesticides, the highest number of calls were due to pyrethroids (26.23%) followed by rodenticides (17.06%), organophosphates (6.26%), carbamates (4.95%) and others (4.86%). In agricultural pesticides group, the organophosphates (9.79%) ranked the first followed by, aluminium phosphide (9.65%), organochlorines (9.31%), pyrethroids (3.87%), herbicides, weedicides and fungicides (3.20%), ethylene dibromide (2.82%), and others (1.70%). The data analysis shows a high incidence of poisoning due to household pesticides as compared to agricultural pesticides, clearly emphasizing the need for creating awareness and education about proper use and implementation of prevention programmes.

1. Introduction

There is an extensive worldwide production and use of pesticides, aimed at increasing agricultural yields, crop variety and preservation. Pesticides have also been used in domestic and public health domains. Their benefits are numerous but the damages are appalling, especially when misused. Acute poisoning with pesticides due to accidental and intentional exposure is an important cause of morbidity and mortality. The actual incidence of poisoning due to pesticides is not known, because all patients do not report to hospitals. Further, all poisoning calls are also not reported to the Poison Centres.

Poisoning due to pesticides and the associated mortality is a worldwide problem.[1] In developing countries, where large quantities of pesticides are used, there is an increased incidence of accidental and intentional poisoning, resulting in a large number of deaths.[2–4] The risk of poisoning is further increased, especially in rural setting, where the agriculture dependent populations often store them in and around their homes. The WHO reports a high mortality due to pesticides from developing countries.[5] On the contrary, the US Poisons Control Centres report a decline in both incidence and mortality rate due to pesticides.[6]

India is one of the largest producers of pesticides in Asia, but the consumption is low.[7] The indiscriminate and non-judicious use of pesticides poses a serious challenge to human health and consequently to environment. Extrapolation of data based on a study from India, estimates an annual mortality of more than 5000 people due to pesticide poisoning in the State of Andhra Pradesh alone.[8]

There are a number of hospital based studies in India, highlighting poisoning due to pesticides.[9–12] But reports based on telephone calls made to Poison Centres in our country are scarce.[13–15]

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In India, the National Poisons Information Centre (NPIC) in the Department of Pharmacology at the All India Institute of Medical Sciences (AIIMS), New Delhi, provides round-the-clock telephone service on management of various poisonings, all over the country.[16] The data analysis of the telephone based poisoning calls received by NPIC indicates that both household and agricultural pesticides were commonly consumed.

Therefore, the present retrospective study, based on the telephone calls made to the Centre, is aimed to determine the incidence of intentional and accidental poisoning due to pesticides. The study also highlights the common classes of products involved in poisoning. However, the actual incidence of poisoning due to pesticides in India may differ from the present results due to under reporting of poisoning cases in India.

2. Methods

The telephone calls received by the Centre were entered into a preset proforma and then into a retrievable database. The call details sought from the caller included the enquirer's name, address, patient's age, sex, route of exposure, mode and symptoms of poisoning, treatment already provided and necessary queries about the patient. The information desired by the caller was conveyed after consulting the database and literature. All the information about the calls was documented.

Pesticides were divided into two groups, viz household pesticides (Gr.I) and agricultural pesticides (Gr.II). The household pesticides (Gr.I) comprised products which are primarily used in households mainly as mosquito and cockroach repellants, insecticides and rodenticides. The agricultural pesticides (Gr.II) comprised various formulations of insecticides, herbicides, weedicides, fungicides etc used in agricultural fields.

3. Results

During the study period (1999–2012), a total of 14,867 poisoning calls were received by the NPIC. Poisoning calls due to pesticides (n = 4929) were reviewed retrospectively (Fig. 1). The queries mainly included information on first-aid measures, nature of product consumed, likely signs and symptoms, treatment, specific antidotes, their dosage and availability. The age ranged from less than 1 to 65 years. The age group mainly involved in poisoning was 18–35 years. The number of males were found to be more than females (M = 62.19%, F = 37.80%). The common mode of poisoning was intentional (64.60%) mainly in the age group of 18–35 years, followed by unintentional (34.40%). There were 1270 (36.59%) calls involving children below 16 years of age. Children below the age of 6 years were mainly involved in accidental poisoning (62.31%). The mode of poisoning was unknown in a few cases (1%). The commonest route of exposure was oral (99.93%) followed by dermal (0.05%) and inhalation (0.02%) routes.

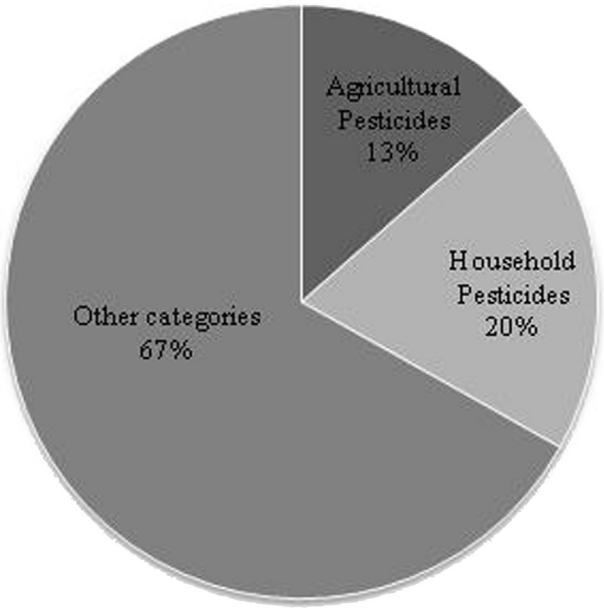

Fig. 1. Incidence of pesticide poisoning.

The household pesticides consisted of 59.38% (n = 2927) and agricultural pesticides comprised 40.61% (n = 2002) calls (Table 1). The number of cases due to household pesticides has shown an increased trend as compared to agricultural pesticides (Fig. 2). Amongst the household pesticides (Gr.I), the highest incidence was due to pyrethroids (26.23%) followed by rodenticides (17.06%), organophosphates (6.26%), carbamates (4.95%)and an insecticide containing elemental mercury, used for grain preservation in households (4.86%) (Table 1). An increased incidence in poisoning was noted due to pyrethroids and rodenticides over thirteen years, as compared to organophosphates and carbamates which have shown a decline in use (Fig. 3).

In the agricultural pesticides group (Gr.II), organophosphates (9.79%) were most commonly used followed by aluminium phosphide (9.65%), organochlorines (9.31%), pyrethroids (3.87%), herbicides and weedicides (3.20%), ethylene dibromide (2.82%). Carbamate insecticides used in agriculture were involved in very few cases (0.24%) (Table 1). Aluminium phosphide, organochlorines and organophosphates have shown a rise in incidence over the past few years (Fig. 4).

4. Discussion

In India, there are a number of hospital based studies on acute poisoning due to pesticides, but reports on poisoning calls based on telephone queries in general and pesticides in particular are scarce.

A retrospective analysis of the telephone calls on pesticide poisoning received by NPIC was carried out. The number of calls received by the Centre was much less as compared to other Poison Centres in the world. On the contrary, a higher number of calls have been reported in lesser period by Milan Poisons Control Centre.[17]

The likely reason for less number of calls made to NPIC could be the hesitation to call the Centre, because of medico legal hassles and the social stigma associated with intentional poisoning in India. The underutilization of the services of the Centre and less

Table 1
Types of pesticides consumed.

	No. of cases, n = 4929	%	Total %
Household pesticides			
Rodenticides	841	17.06	59.38
Pyrethroids	1293	26.23	
Organophosphates	309	6.26	
Carbamates	244	4.95	
Others	240	4.86	
Agricultural pesticides			
Organophosphates	483	9.79	40.61
Aluminium phosphide	476	9.65	
Organochlorines	459	9.31	
Carbamates	12	0.24	
Pyrethroids	191	3.87	
Ethylene dibromide	139	2.82	
Herbicides/weedicides	158	3.20	
Others	84	1.70	