

PESTICIDE POISONING CASES ATTENDING FIVE MAJOR HOSPITALS OF NEPAL

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ABSTRACT

Although some hospital-based data are available, there are no large scale or nation-wide data available on the problem of pesticide poisoning in Nepal. This study was done to fill up this gap to some extent and was carried out at five major hospitals of Nepal - Bir Hospital, Patan Hospital and Tribhuvan University Teaching Hospital (TUTH) in Kathmandu, Western Regional Hospital (WRH) in Pokhara, and B. P. Koirala Institute of Health Sciences (BPKIHS) in Dharan. A harmonized Pesticide Exposure Record (PER), which was finalized during the "WHO Regional Workshop on Pesticide Poisoning Database in SEAR Countries" held in 1999 in Delhi,¹ was used in the study. Data collection was done for a period of six months in each of the five hospitals.

Altogether there were 256 patients in the present study. There were 98 patients from Bir hospital, 48 from Patan hospital, 45 from TUTH, 36 from BPKIHS, and 29 from WRH. Of the 256 patients, 112 were males and 144 females. The most common age group involved in pesticide poisoning was 15-24 years. In most of the cases patient's arrival to hospital was within three hours after pesticide exposure. In the majority of cases the nature of exposure was intentional and the route of exposure oral. Most poisonings occurred in urban set-up and at home.

Organophosphorous compounds were found to be the most common pesticides involved (in >50% cases), followed by zinc phosphide and aluminium phosphide. All cases were given first aid treatment in the Emergency Room of the study hospitals, following which most of the cases (n=197) were admitted; the rest were discharged or referred to other hospitals. Systemic effects of poisoning were recorded to have been present in 95% of cases. For nearly two-third (65.6%) of the cases the poisoning severity score was recorded in the PER as "moderate" or "severe." More than 16% of patients had fatal outcome.

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Improved regulation on availability of pesticides, strict registration of vendors, modification in packaging of pesticides, adequate provision of information to the public, further research on pesticide poisoning (including community-based studies), creation and regular revision of national/local standard treatment guidelines (STGs), regular training of health care providers based on such STGs, better availability of drugs/antidotes, establishment of poison information centers, and enhanced regional linkages are some of the measures that will help reduce the problem of pesticide poisoning in Nepal.

Key Words: Pesticide poisoning, Organophosphates, Zinc phosphide, Aluminium phosphide, Pesticide exposure record, Hospital, Nepal.

INTRODUCTION

The United Nations Conference on Environment and Development (UNCED) held in Brazil in 1992 clearly recognized the need for sound management of chemicals for the protection of health and human environment. Following this, a Regional World Health Organization (WHO) Consultation was held in Bangkok in 1998 and the country reports presented during this Consultation indicated that there is a widespread use of pesticides in the South-East Asia Region. This Bangkok Consultation adopted a WHO South East Asia Regional Framework of National Actions for Chemical Safety Promotion. There was another Informal Consultation in Delhi in 1998 on issues related to strengthening of activities on chemical safety and prevention of toxic exposures. Subsequently, WHO organized a "Regional Workshop on Pesticide Poisoning Database in SEAR Countries" in Delhi in 1999.¹ Nepal represented in this Workshop and participated in preparatory activities for harmonized case data collection in selected countries of the Region. The data collection plan foresaw participation of India, Indonesia, Nepal, Sri Lanka and Thailand. Subsequent to these preparatory developments, the present study on pesticide exposure was carried out in different hospitals of Nepal.

The objectives of the present study were to: generate data on pesticide poisoning cases with special reference to the type of pesticide and circumstances of poisoning and the main population group affected; identify the main products involved in human pesticide exposure and/or poisoning; set the basis for planning prevention and educational strategies; and contribute to the regional and global components of the project.

METHODOLOGY

Five major hospitals of Nepal were included for data collection in this study. The hospitals were: Bir Hospital, Patan Hospital, and Tribhuvan University Teaching Hospital (TUTH) in Kathmandu, Western Regional Hospital (WRH) in Pokhara, and BP Koirala Institute for Health Sciences (BPKIHS) in Dharan.

The Pesticide Exposure Record (PER) used for the present study was the one that was finalized in Delhi in May 1999 during the Pesticide Poisoning Database Workshop mentioned above.¹ The PER had the following components: exposure time and place; communication (source of information); patient details; circumstances of exposure; main activity at the time of exposure; location of exposure; route of exposure; product identity;

chemical type; management; severity grading; outcome; comments. The entries within each of these components were made according to the written instructions, guidelines and definitions provided by the WHO.²

Before the data collection was begun, the nature of the study and the details of the PER were discussed and clarified in each of the above hospitals. At Bir and Patan Hospitals, the PER along with the definitions was discussed first with the Emergency (ER) Chief and then with the various house officers working in the ER. As the house officers working in the ER of these Hospitals were not fixed, the main responsibility for filling the PER was taken by the ER Chiefs. At TUTH, the PER was discussed with the faculty members and MD(GP) residents working in the ER. The primary responsibility was given to an MD(GP) faculty member. In Bir, Patan and TU Teaching Hospitals, the data were collected prospectively. In WRH, the study team members went and discussed about the PER and the definitions of its components with the medical officers working in the ER of that Hospital. The primary responsibility was given to one of the ER physicians. But he was subsequently transferred and the job could not be done prospectively. Later this was discussed with one of the MD(GP) residents working in that Hospital and retrospective data was collected from the Hospital record. At BPKIHS, the PER and the definitions of its components were discussed with the medical officers working in the ER but at this Institute also the data could not be collected prospectively due to noncompliance on the part of the medical officers. Subsequently, this was discussed with one of the MD(GP) residents working in the same Institute and the data were then collected retrospectively.

The data collection was done during a 6-month period in all the hospitals (Table I).

Table I : Data collection period in the study hospitals

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All the completed forms were obtained from the different hospitals and then carefully checked. All data entry into the computer was done by a medical doctor with specialist degree in general practice. The data entered into the computer were rechecked and then finalized.

RESULTS

Of the total 256 patients of the study, there were 112 males and 144 females (Table II); this gives a female:male ratio of 1.3:1. In Bir Hospital, Patan Hospital, TUTH and WRH, there were more female poisoning cases than male. But it was interesting to note that there were more male cases in BPKIHS.

Table II : Total poisoning cases in different hospitals.

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The most common age-group involved in pesticide poisoning was between 15 and 24 years of age. The next common age-group was 25 to 34 years. The total number of cases in the age-group 15 to

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mentioned in the hospital record; thus the corresponding column was filled as unknown.³

In almost all the cases (254/256) the route of exposure was oral as poisonings were intentional. In one case the route was reported as respiratory and in one case as unknown.³

Organophosphorous compounds were found to be the most common insecticides used. Altogether 133 cases (methyl parathion – 80, dichlorvos – 53) were reported with organophosphorous poisoning. Zinc phosphide, a rodenticide, was found to be the next commonly involved poison. A total of 29 poisoning cases were recorded to have been caused by this agent. The third important agent involved in poisoning was aluminium phosphide (n=18). In 23 cases the pesticide used belonged to other different categories. These included flea poison, pyrethrin, phenol, bromadiolone, dythion M, 'chemical used

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to kill bugs' (name not mentioned), and 'biofertilizer' (name not mentioned). In 54 cases it was not known what were the compounds involved in the poisonings. In the two centers (BPKIHS and WRH), where data were collected retrospectively, most of the records did not contain information on the type of compound involved in poisoning (Table IV).

All the 256 cases of this study were given first aid treatment when they arrived at the Emergency Rooms of the hospitals. Following this, the patients were either admitted (n=197) or discharged or referred to other hospitals (if there were no beds available) (Table V). In some instances the patients left against medical advice.

Table V : Poisoning cases that were hospitalized & those that were not hospitalized

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Hospital stay of the admitted cases varied from a minimum of one day to a maximum of 27 days. A large proportion of patients (60/197) were in the hospital for more than eight days. Forty-two patients were in the hospital for 1 to 2 days and 41 were for 7-8 days (Table VI).

Table VI : Days of hospitalization of poisoning cases in different hospitals

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In most instances the patients were admitted to the medical wards of the respective hospitals, unless the patient was very serious. In such cases the patients were kept in the Intensive Care Units (ICU). Once the patients were stable, they were transferred to the medical ward. In WRH, where there was no ICU at the time of data collection, all the patients were admitted to the medical ward. There is ICU in Bir Hospital but records from this Hospital do not show any admission of poisoned cases to this Unit. Only the Total number of hospital days is mentioned. In Patan Hospital, six patients were admitted to the ICU and the number of days of stay in the ICU varied from one to 17 days. The patient who was in the ICU for 17 days needed tracheostomy and later developed tracheal stenosis. In BPKIHS, four patients were admitted to the ICU, where their stay varied from 3 to 17 days. In TUTH, only one patient was admitted to the ICU, where the patient had to stay for 13 days.

Systemic effects were seen in more than 95% (245/256) cases. Localized effects were seen only in six cases (five at Patan Hospital & one at TUTH).³ In five cases the type of effect was not recorded in the PER (three at BPKIHS & one each at Bir & Patan Hospitals).

Regarding poisoning severity score (PSS),² the maximum number of cases were recorded to be of 'moderate severity' (n=107). The score was recorded as 'minor' in 66 cases, 'severe' in 61 cases, and 'none' in 14 cases (Table VII). In eight cases PSS was not recorded.

Table VII : Poisoning severity score of cases attending different hospitals

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About three-fourth (187/256) of the poisoned patients of this study recovered. Eight cases recovered with sequelae. Forty-two (16.4%) died. In 19 cases the outcome was not known (Table VIII). These were the patients who either left the hospital against medical advice or were transferred to other hospitals.

Table VIII : Outcome of poisoning cases attending different hospitals

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Analysis was done regarding the outcome of patients in relation to their arrival to hospital after exposure to the poison. In Bir Hospital, six patients attended the Emergency Room (ER) within less than an hour after exposure; out of them one died and five recovered. Sixty-nine patients attended between one and three hours after exposure, of whom 16 died and 53 recovered. Sixteen patients attended the ER between four and six hours after exposure, of whom two died and 14 recovered. Four patients came to the ER between seven and nine hours; of these three died and one recovered with sequelae. Two patients came between 10 and 13 hours; one of them died and the other recovered. One patient came more than 13 hours after exposure and died.

In BPKIHS, all 36 patients arrived within less than an hour; of these five died and 25 recovered. The outcome for the remaining six was unknown.

In Patan Hospital, 18 patients came to ER within less than an hour after exposure; of these 16 recovered and one recovered with sequelae; in one case the outcome was unknown. Twenty-five cases

came between one and three hours; of these 20 recovered; the outcome was unknown in five cases. Four cases arrived in ER between four and six hours; of these two died and two recovered. One case came between 10 and 13 hours and recovered.

In TUTH, 15 cases came to ER within less than an hour after exposure. Of these two died and nine recovered; the outcome was unknown in four cases. Eighteen cases came between one and three hours, of whom five died, 10 recovered, and one recovered with sequelae; the outcome was unknown in two cases. Five cases came between four and six hours, of whom one died and three recovered; the outcome was unknown in one case. Three cases came between seven and nine hours; of these one died and two recovered. Two cases came between 10 and 13 hours and both recovered. Two cases came after 13 hours, of whom one died and one recovered.

In WRH, all 29 cases came within less than an hour after exposure; of these one died, 23 recovered, and five recovered with sequelae.³

DISCUSSION

Pesticides are widely used all over the world and are a cause of much morbidity and mortality, especially in developing countries.⁴ Of the total amount of pesticides used in the world, only a small proportion is used in developing countries, but much of morbidity and a lot of mortality associated with these agents occurs in such developing countries.⁵

Pesticides are commonly used in Nepal. Their use is quite intense in the Tarai (flat plain area of Nepal) and the Kathmandu Valley.^{6,7} Overuse and misuse of these agents are often seen.⁸

His Majesty's Government of Nepal (HMG/N) formed the Pesticide Act in 1991, the Pesticide Rules

in 1993, and the Pesticide Board in 1994. The Act regulates the import, manufacture, sale, transport, distribution and use of pesticides with a view to preventing risk to human beings and animals and for matters connected therewith.^{4,7} Over some years there have been some encouraging activities such as registration of pesticides, orientation and registration of importers/retailers, and provision of inspectors. There is, however, a lot of room for improvement in the implementation aspect of these rules and regulations. There is inadequate provision of information to the people on safe storage and use of pesticides. There is also lack of adequate information on alternatives to chemical control such as integrated pest management.⁴

The present study was done in five hospitals of Nepal - three in the capital city Kathmandu within the Central Development Region, one at Pokhara in the Western Development Region, and the remaining one at Dharan in the Eastern Development Region. The Total number of patients was 256. The maximum number of patients were at Bir Hospital (n=98), which is a large government hospital situated in the center of the capital city. One reason for this relatively large number of patients at Bir Hospital could have been its central location. Patan Hospital and TUTH, which are situated at two ends of Kathmandu city, had almost equal number of patients; Patan Hospital had 48 cases and TUTH 45. Outside the capital, WRH and BPKIHS also had similar number of patients; WRH had 29 cases and BPKIHS 36 cases.

On the whole, there was female predominance with a female:male ratio of 1.3:1. This finding is consistent with several other studies done in the past.⁹⁻¹³ At individual hospital level also, there was female predominance except at BPKIHS, where male cases were more than female. This male predominance at BPKIHS needs further exploration.

Almost all the cases of poisoning in the present study were found to be intentional. Only a few were reported to be accidental. Poisonings due to agricultural exposure were not found in any of the major hospitals. As expected, the most common age group involved in poisoning was 15-24 years; about 45% of cases were of this age group. The vast majority of poisonings coming to the hospitals of this study were from urban set-up and most of the poisonings were recorded to have occurred at home.

In most of the cases patient's arrival to hospital was within three hours after pesticide exposure. But the arrival time ranged from within an hour to as long as 13 hours after exposure. The vast majority of cases were intentional in nature and, as expected, the route of exposure in most cases was oral.

Consistent with previous reports,⁹⁻¹³ organophosphorous compounds were found to be the most common insecticides involved. More than 50% of poisoning cases of this study were due to these agents. The most commonly used organophosphates were methyl parathion and dichlorvos. Even though there are several brands of these two agents registered in Nepal, only one popular brand of each, ie, the brand "Metacid" of methyl parathion and the brand "Nuvan" of dichlorvos were found to have been used.

Zinc phosphide was the next most commonly used agent. There were many cases of poisoning with aluminium phosphide ("Celphos"), especially at hospitals of Kathmandu city and a high mortality was seen with this poisoning. Poisoning due to this agent was not found in hospitals outside Kathmandu valley.

A large proportion of the admitted poisoning cases were kept in the hospital for more than one week, of whom several cases were initially kept in the ICU. These findings highlight major demands in terms of cost and workload.

Nearly two-third (65.6%) of the cases of poisoning were recorded in the PER as "moderate" or "severe" in PSS scoring. More than 16% of patients had fatal outcome. A large number of patients arrived in the hospitals within six hours of exposure and both recovery and death were high during this period.

Of the five hospitals of this study, data collection was done retrospectively in two (WRH and BPKIHS) and prospectively in three (Patan Hospital, Bir Hospital, and TUTH). In the hospitals where data collection was prospective in nature, the filling of the forms was complete, whereas in the hospitals where data were acquired retrospectively, some aspects in data collection remained incomplete, mainly because of incomplete record keeping. This highlights the limitation of retrospective data collection in countries like Nepal where record keeping is often poor and incomplete even in major hospitals.

Free availability of pesticides is contributing to easy access and use of these agents for suicidal purposes. There should be urgent action towards increased restriction in the availability of these agents. There is need for proper registration of not only the pesticides but also of the vendors.

There should be provision of leaflet or information sheet for users on the pesticide sold in local language describing the general do's and don't about pesticide use as well as relevant information about the specific product sold. This leaflet should also include information about safe storage of the pesticides at home under lock and key.

The brands "Metacid" and "Nuvan" are very popular and commonly used for self-poisoning. The

brand "Celphos" is also increasingly becoming popular for this purpose. So there should be increased alertness, and perhaps some restriction, regarding the sale of these products so that the possibility of misuse of these agents is lessened.

One mechanism that could significantly help reduce the morbidity and mortality associated with the misuse of pesticides is modification in the currently available products in terms of having lesser concentrations and smaller volumes of packaging of these products.

The existing poisoning management system should be strengthened by establishing/expanding poisoning database, regular training of physicians, providing treatment guidelines in all the hospitals, ensuring availability of drugs/antidotes, and establishing poison information centers.

There is an important and unfulfilled need for reasonably large-scale community-based study on the incidence and epidemiology of pesticide poisoning. Further large-scale hospital-based studies are also needed that involve more hospitals covering all Regions of the Country.

Regional linkages should be enhanced for policy formulation, policy implementation, treatment guidelines, exchange of information, and creation of other regional standards and procedures on the availability and use of pesticides as well as management of poisoning. Regional training centers for pesticide poisoning and management could be a strong step towards increased regional linkage.

The present study found that incomplete record keeping of cases of poisoning is common in hospitals. It is very important that proper record keeping with complete information is maintained in health facilities. This may require repeated training of health personnel and regular medical auditing.

As most of the cases of poisoning are suicidal in nature, all patients with poisoning must be given psychiatric assessment during their stay in the hospital and also at the time of discharge. If possible, follow up visits should also be planned.

All vendors must be trained to ask a few questions to try to find out the real purpose of buying the pesticides. In case of any doubt, the pesticides should not be sold at least on that day and to a lone buyer.

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REFERENCES

1. WHO. Pesticides Poisoning Database in SEAR Countries. Report of a Regional Workshop, WHO/SEA RO, New Delhi, 5-7 May 1999 (SEA/EH/528).
2. WHO. Epidemiology of pesticide poisoning: harmonized collection of data on human pesticide exposures in selected countries of the South East Asia Region – guidance document for project participants in SEA countries. United Nations Environment Programme, International Labour Organization and World Health Organization (undated).
3. Gupta SK, Joshi MP. Pesticide poisoning data in Nepal. Report submitted to the World Health Organization, Nepal, 2002.
4. Anonymous. Unsafe use of pesticides in Nepal. Drug & Therapeutics Letter, Volume 5, No. 4, Jul-Aug 1998.
5. Joshi MP, Khakurel BK. Safe use of pesticide. Access 1998; 1 (3): 3-4.
6. Baker SL, Gyawali BK. Promoting proper pesticide use in Nepal. Research Report Series No. 28. Published by HMG Ministry of Agriculture / Winrock International, November 1994.
7. Palikhe BR. Pesticide management and national challenges in Nepal. Paper presented in the Regional Awareness Raising Workshop on the Rotterdam Convention on the Prior Informed

- Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, 8-11 December 1998, Bangkok, Thailand.
8. Manandhar PP, Palikhe BR. POPs: current situation in Nepal. Paper presented at the Regional Workshop on Management of Persistent Organic Pollutants (POPs), 16-19 March 1999, Hanoi, Vietnam.
 9. Pokharel N, Gurung CK. A study of poison cases recorded in Bir Hospital over four years. Journal of the Institute of Medicine 1987; 9 (1): 29-34.
 10. Subedi BK. A retrospective study of poisoning cases at Bir Hospital, Nepal. Journal of the Institute of Medicine 1990; 13 (4): 296-302.
 11. Kafle KK, Gyawali KK. Organophosphorous - commonest poisoning agents. Journal of the Institute of Medicine 1992; 14 (3): 228-233.
 12. Prasad PN, Karki P. Poisoning cases at TUTH Emergency: a one-year review. Journal of the Institute of Medicine 1997; 19 (1-2): 18-24.
 13. Karki P, Hansdak SG, Bhandari S, Shukla A, Koirala S. A clinico-epidemiological study of organophosphorus poisoning at a rural based teaching hospital of Eastern Nepal, 1997.



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