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**POISONING: DISSEMINATION OF LIFE SAVING INFORMATION -
ACTIVITIES AND EXPERIENCE OVER A DECADE**
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Early humans through experience knew harmful properties of plants, insects, venomous snakes and chemicals. Men utilised some of the toxic plants to incapacitate or kill animals (arrow poisons), while women perhaps used plant constituents as herbal medicines. Concerns about prevention and treatment of poisoning gradually emerged in the community while antidotal activities of some substances were recognised. The Ebers papyrus written between 1553 and 1550 BC in Luxor, Egypt, contained a great deal of information on toxic substances including opium, aconite, hyoscyamus, lead and copper. There were descriptions on insect and animal venoms also (1). The Sanskrit documents Rig-Veda, written between 1500 and 1200 BC and Ayur-Veda, written about 700 BC in India also mentioned poisons and antidotes.

In Sri Lanka, the first report on poisoning was published in a western medical journal in 1865. It was about the poisonous properties of *Calotropis gigantea* (2). Since then, poisoning with different plants and chemicals appeared in the medical literature. The first case of drug poisoning was documented in 1955, while the first report of pesticide poisoning was published in 1962 (3,4).

Sri Lanka and many other developing countries in the world have been made aware of the importance of poisoning as a major health concern in the last few decades (5,6,7). With the improvement of socio-economic status, literacy and health services, especially preventive health services, morbidity and mortality from communicable diseases have shown a decline. However, morbidity and mortality from non-communicable diseases such as coronary heart disease, diabetes mellitus, hypertension, trauma, accidents and poisoning are increasing.

In 1998 for example, the leading cause of hospital deaths in Sri Lanka was ischaemic heart disease (8). As shown in Table 1, poisoning was the third leading cause of death in state hospitals.

Incidence of poisoning, which was steadily increasing in the last few decades, reached a peak in 1998 as shown in Table 2(9). There were 80054 admissions from poisoning, including snakebites, resulting in 3034 deaths. It has to be noted that no data were available from Mullaitivu and Mannar districts, while even in other districts, all deaths and live discharges were not analysed.

Pesticides are the commonest chemical substances causing poisoning. This is not surprising when one considers the fact that agriculture is the most important sector in Sri Lanka's economy, employing over half the labour force. Pesticides accounted for 21429 admissions and 2250 deaths.

Even in developed countries like the United States of America and the United Kingdom, health care professionals usually have little knowledge of the toxic ingredients contained in various pesticides and household chemicals. Although medical professionals are aware of chemical and adverse effects of drugs, their knowledge is limited regarding management when they are presented with an overdose.

To provide quick, accurate and tailor-made information on toxic ingredients of poisons, their chemical effects and complications, and management of patients presenting with poisoning, poison information centres or poison control centres were established in developed countries. In the United States, for example the major concern was poisoning in childhood, and in 1953 the Director of the Division of Services for Crippled Children at the University of Illinois and of the Illinois Chapter of the American Academy of Paediatrics was asked to form a subcommittee on poisoning (10). One objective of the Committee was to inform and work with physicians to educate parents in methods used in the prevention of childhood poisoning. An outcome of this was the establishment of the first poison control centre in the world. The Centre prepared an 85 page loose-leaf manual on poisoning, which was later published by the American Academy of Paediatrics under the title "Accidental Poisoning in Childhood"(11)

The Standing Medical Advisory Committee to the Central Health Services Council of the National Health Service, United Kingdom, appointed a sub-committee on the "Treatment of acute poisoning in hospitals" in 1961. It recommended that "An information service on poisoning should be set up with central arrangements for co-ordination"(12). The task of implementing this was undertaken by Dr. Roy Goulding of the Department of Pharmacology, Guy's Hospital, London. With the co-operation of the Board of Governors of Guy's Hospital and active personal support of Professor Keith Simpson, Professor of Forensic Medicine, Dr. Goulding established the first poison information service in the United Kingdom(13). This service, now known as the Medical Toxicology Unit, is in the premises of the New Cross Hospital, London. It is one of the key centres in Europe.

In 1973, seven consultant physicians of the premier teaching hospital in Sri Lanka, the General Hospital, Colombo, suggested the establishment of a "Toxicology Advisory Bureau whose services should be made available to medical practitioners to render advice in cases of poisoning" (14). It took another thirteen years even to initiate the establishment of a Poisons Information Service in Sri Lanka. This was possible thanks to a generous three year project grant to the author from the International Development Centre (IDRC), Canada, channelled through the Ministry of Teaching Hospitals in 1986. With the technical support of the Poisons Unit, London, the National Poisons Information Centre started functioning in January 1988 (15,16,17).

Information is of no value unless it is disseminated to fulfil the needs of the community or selected sections in the community, who can utilise them. Major routes of dissemination of information are (a) through print media (b) through electronic media and (c) by having seminars, conferences and workshops. Since 1986, information on poisoning was disseminated by the author to health care professionals in Sri Lanka by various means. This presentation discusses the experience, activities and efforts of the author to disseminate information on poisoning among health care professionals and others in Sri Lanka over a decade.

Methods

1. Since the establishment of the National Poisons Information Centre, every enquiry received by the Centre was recorded on a standard call sheet. The time, date, mode of enquiry, enquirer's name and location, details of the victim, toxic agent and quantity, route and circumstances of poisoning, symptoms and signs, treatment, investigations performed, and adequacy and source of information provided to the enquirer were documented. In cases of acute poisoning a follow-up call was made by the Centre within 48 hours, and if necessary later, to ascertain the outcome.
2. Whenever possible the author and the Centre made efforts to publish posters, leaflets, articles and books on poisoning. They were utilised by health care professionals in the management of poisoning.
3. Seminars, conferences and workshops have been held for different groups of health care professionals and non-medical personnel who can in turn disseminate knowledge on first aid and prevention of poisoning.

Results

1. The National Poisons Information Centre (NPIC) has received 4070 communications from 1988-1997. Out of this, 3671 were telephone enquiries. Three hundred and sixty eight were personal visits made to the centre by either medical officers or members of public, 28 were written enquiries and 3 international enquiries were received through fax and e-mail. Table 3 indicates the purpose of the enquiries. Medical officers, other health care personnel and many other categories of individuals contacted the Centre for information as shown in Table 4. Distribution of calls by month varied from 7.8% in January to 9.5% in October. Distribution of calls by time of the day is shown in Tables 5.

Of the 4070 enquiries 28 were written enquiries, 03 were received by fax and e-mail (International). The time at which the enquirer contacted the centre was not documented for 9 enquiries. All the enquiries except for 164 were regarding patients. Those 164 enquiries were to obtain some information on toxic substances. They were analysed according to the agent. Pesticides (27%), industrial/commer-

cial products (26%), pharmaceuticals (13%), plants (12%) were the commonest agents. Substances used for abuse, warfare/antiriot agents, snake venom and household/leisure products accounted for 3% each. Other enquiries were for agrochemicals other than pesticides, animal bites, and food and beverages.

Thirteen calls were to obtain statistics on poisoning. One call was regarding the establishment of a poison centre. Seventy four enquiries were not related to poisoning. Some of them were allergic reactions and adverse effects developed after taking therapeutic doses of drugs. Others were later diagnosed as having a disease condition. During the period from 1988-1997 there were 3740 enquiries on human exposure. The enquiries related to a patient or patients are analysed according to the toxic agent in Table 6. Distribution of calls by sex and age is shown in Tables 7 and 8. Distribution of patients by circumstances of poisoning is shown in Table 9. Circumstances in 'Other' include the following:

- * overdoses taken to relieve pain or to cause an abortion
- * prescribed or administered an overdose of a drug
- * adverse reactions and toxic effects of prescribed ayurvedic preparations
- * poisoning after eating leaves and tubers such as manioc
- * using non-edible plants such as *Acalypha indica* (Kuppamenia) for preparation of curries
- * consuming illicit liquor containing methanol as a substitute for ethanol

As expected, 3674 (98.39%) of all enquiries were for acute exposures. The rest (1.61%) were for chronic exposures. The type of exposure (acute/chronic) was not recorded in six instances where the enquirer wanted to get blood samples analysed for lead levels. The route of exposure is shown in Table 10.

The severity of symptoms and signs were documented in 91% of instances (Table 11). The analysis of outcome of patients showed that 71% have recovered and 8% died (32 patients were already dead when the Centre was contacted for information) (Table 12). Nineteen enquiries were regarding poisoning in pregnancy. One pregnant patient died and in another instance where a patient took a pesticide to attempt suicide had an intra- uterine death. Twelve enquiries received were on deliberate poisoning where in 2 instances the patients motive was to abort the foetus. In 7 instances pregnant patients took pesticides and in another 3 instances took drugs to attempt suicide. In the other 2 instances patients took industrial chemical and an anti-dandruff product respectively. The other enquiries were on snake bite, a giant centipede bite and poisoning after eating manioc leaves.

2. Publications: The second method of dissemination of information was through publications.

The publications of the author and the Centre either highlighted problems clinicians were facing in the management of poisoning or informed them of various aspects of poisoning such as symptoms, signs and clinical management. An editorial of the Ceylon Medical Journal in 1988 titled "Poisoning in Sri Lanka" created an awareness of the alarming increase in cases of poisoning in the eighties(18). Other publications were:

- (A) A case of fatal accidental paraquat poisoning where a young boy developed irreversible lung fibrosis after drinking water using an "empty" paraquat bottle, which highlighted (a) the diagnostic difficulties faced by the clinicians and (b) the need to dispose safely empty pesticide containers(19).
- (B) Developing respiratory failure from organophosphorus poisoning due to absorption through the skin of a patient. It stressed the importance of skin absorption pesticides and the complication of delayed respiratory failure from organophosphorus poisoning(20). The latter condition is now known as 'Intermediate Syndrome'(21).
- (C) Preventable acute organophosphorus poisoning deaths in hospitals warning the clinicians of the danger of discontinuing atropine therapy prematurely(22).

- (D) The risk of disc battery ingestion by children(23)
- (E) The problem of childhood poisoning(24, 25) .

“First aid and treatment for poisoning” sponsored by the Mackwoods Winthrop(26), “Management of Pesticide Poisoning” sponsored by the Pesticide Association of Sri Lanka(27), “Pesticides in Sri Lanka” sponsored by the Friedrich Ebert Stiftung(28) and “Management of Acute Poisoning” sponsored by the IDRC, Canada(29) were the publications of the author that disseminated useful information on poisoning.

The last publication, “Management of Acute Poisoning” is widely used by hospital doctors since 1991. It provides information on common toxic agents. Pesticides poisoning continues to be a major health concern in Sri Lanka. A publication of the Centre, “Pesticide poisoning in Sri Lanka - Review of the eighties and the outlook for nineties” analysed 1704 cases of pesticide poisoning and 222 deaths in hospitals in the Western Province(30). Pesticide poisoning was the leading cause of hospital deaths in seven districts, namely, Anuradhapura, Polonnaruwa, Matale, Hambantota, Mannar, Vavuniya and Moneragala in 1995.

A poster on “First aid for poisoning” published in Sinhala, Tamil and English was distributed to primary health care centres in 1990. The IDRC, Canada sponsored this. A brochure on “First aid for pesticide poisoning” published in all three languages were also distributed in the plantation districts in 1988. This was sponsored by the Friedrich Ebert Stiftung.

The effects of these publications are difficult to evaluate quantitatively. No one could determine how many lives were saved or serious toxicity was prevented by following advice or reading information given in these. The constant enquiries for copies of the publications are a source of encouragement. The book on “Management of Acute Poisoning” for example is undoubtedly widely used and I was informed that it is referred to 3 to 4 times a day in some hospitals.

3. Seminars and conferences:

The first educational seminar was organised by the NPIC in 1987. It was a collaborative effort of the NPIC, the Sri Lanka Medical Association, the Ministry of Health, and the Ministry of Women’s Affairs and Teaching Hospitals. It was funded by the IDRC. Over 150 doctors attended the scientific programme where all aspects of poisoning were discussed by professors of medicine, paediatrics, pharmacology and forensic medicine, and by physicians, paediatricians, family physicians and surgeons.

A series of seminars were held in 1986 in the Nuwara Eliya District to educate over 300 estate medical assistants on prevention and first aid on poisoning. These were organised by the Ceylon Workers Congress and funded by the Friedrich Ebert Stiftung. In 1996 and 1997, a series of training seminars on poisoning were held for doctors in Colombo, Gampaha, Kurunegala, Anuradhapura, Matara and Galle Districts. Nearly 500 doctors participated in these seminars where local physicians and paediatricians and the author delivered lectures. The resources were provided by the World Health Organisation.

In 1997 seminars on “Prevention and First Aid of Poisoning and Home Accidents” were held in Colombo, Maharagama and Angunukolapalessa for 684 teachers. This activity was also sponsored by the World Health Organisation.

At least once in three months lectures on poisoning were held for nurses attending higher training in the Post Basic School of Nursing in Colombo. In July 1997, the NPIC was able to host the first SAARC meeting on poisoning, in Colombo. It was a unique event where all seven countries of the South Asian Association of Regional Co-operation participated. The Ministries of Foreign Affairs and Health sponsored this meeting and the SAARC - Japan Special Fund provided financial resources. The follow up second meeting is planned to be held in Kathmandu, Nepal.

Discussion

The utilisation and the demand of services of the NPIC and the response to its many publications clearly showed that there was a need felt by doctors and other health care professionals to obtain information on poisoning.

The NPIC has only three information officers and they work in the Centre from 8 am to 5 pm on all 365 days of the year. From 5 pm to 8 am the telephone enquiries are answered by the medical officers of the Medical Intensive Care Unit, which adjoins the Centre. If the medical officer is attending a seriously ill patient the calls remained unanswered. Even if they were answered, the doctor did not have time to record the call. Sometimes enquirers directly contacted the author at his office or residence.

If the Centre staff alone could provide a 24 hour service and if all the enquiries were documented the number of calls should have been much more than 4070. Unlike similar Centres in the United States of America, our Centre did not encourage calls from the members of the public. The Centre did not publicise through media its telephone numbers. In spite of this, enquiries from non-health care personnel amounted to 9.3%. With adequate staff and another telephone line, the Centre could provide useful information to the general public in the future. If the telephone facilities in the country were satisfactory and uninterrupted, number of calls could have been higher. Of the 4070 enquiries, 92% were on some aspects of management of poisoned patients. A few enquiries on poisoned pets and other animals were also received.

The distribution of calls by month did not show a significant difference. Nearly 36% of all calls were received from 8 am to 12 noon. Over 80% of the calls were received 8 am to 5 pm when the permanent staff of the Centre were working. The high number of calls from 8 am to 12 noon is perhaps an indication that the doctors could not receive a response from the Centre previous night, as it is known that most of the poisoning cases are admitted in the evening or night. Analysis of agents responsible for poisoning showed that pesticides accounted for 34%, the largest group. This is not surprising as Sri Lanka has a very high incidence of pesticide poisoning and the numbers are increasing(30). Although in state hospitals poisoning from drugs and therapeutic agents amounted to about 12% of all cases of poisoning (including snakebites), 20% of the calls to the NPIC were for those. The third group responsible for most number of calls was industrial and commercial products.

Plant poisoning accounted for 8% of enquiries. In the last decade, *Thevetia peruviana* (Yellow Oleander or Kaneru) poisoning following suicidal attempts showed a marked increase. The other plants responsible for poisoning included *Gloriosa superba* (Niyangala) and *Adenia palmata*. Enquiries were received on haemolysis following ingestion of *Acalypha indica* (Kuppameniya) in G6PD deficient patients(31). Enquiries on mushroom poisoning were an insignificant 0.4% as Sri Lanka does not have mushrooms causing serious toxicity.

Hospital admissions from envenomation from snakebites showed a tremendous increase mainly because of the public education campaigns and publications of the Health Education Bureau of the Ministry of Health and the Sri Lanka Medical Association. In spite of this five-fold increase of hospital admissions from snakebites in the decade ending 1996, (Table 13) enquiries to the NPIC on snakebites amounted to only 2%(9). The likely reason for this is that many doctors are aware of the correct management of snakebite. Analysis of enquiries, excluding episodes where more than one patient was involved, showed that the male to female ratio of victims were 57 : 43. Like in all age groups, poisoning among less than 15 year olds also showed a male preponderance (55%).

The analysis of age groups showed that nearly one fourth were between 20 to 29 years. The age group 15 to 39 years accounted for almost half (49%). This is entirely consistent with the pattern of poisoning in Sri Lanka where the youth are mostly the victim of suicidal poisoning. In this study, 48% of enquiries were for suicidal poisonings. This is consistent with the fact that Sri Lanka has one of the highest death rates from poisoning in the world.

Poisoning in children less than 15 years amounted to 22% of enquiries. With changes in the socio-economic environment in many countries, the importance of childhood poisoning has been highlight-

ed even at global level(32). Drugs and therapeutic agents were responsible for the highest number of calls (27%) received for poisoning in children less than 15 years. This was followed by pesticides (23%). In a study of 4556 patients admitted with a history of poisoning to hospitals in the Western Province of Sri Lanka in 1986, 540 patients (11%) were below 15 years(25). Unlike the enquiries to the NPIC, this study also confirmed other similar reports that the main agent responsible for childhood poisoning was kerosene oil (24).

These facts on childhood poisoning highlight need for educational programmes for parents to keep toxic substances securely stored. In most homes, especially those of low-income groups, storage facilities may be inadequate for household products, medicinal agents and even for known toxic substances such as pesticides. As Joseph R. Christian, an American paediatrician stated, “ the accidental death of a child is a dramatic and tragic result of someone’s mistake”(33). Only a very few enquiries were for chronic poisoning (1.6%). Eighty five per cent of the enquiries were following oral exposure. Dermal exposure (5%) and inhalation (3%) were uncommon modes of poisoning. The Centre attempted to follow up the enquiries to determine the outcome. This was not possible on many occasions due to difficulties in contacting the enquirer by telephone. As a result, the outcome of 591 enquiries (16%) was not known. There were 299 deaths (8%) while 32 (0.9%) were already dead when the enquirer contacted the Centre. The majority 2658 (71%) recovered. As expected, highest number of deaths 157 (52%) were from pesticides, 50 (17%) were from industrial or commercial products and 32 (10%) were due to pharmaceuticals. The majority of enquiries and the majority of deaths (69%) involved males.

Accidental poisoning accounted for 32% of enquiries, while occupational poisoning (2%) and homicidal poisoning (1.2%) were uncommon. There were instances where patients have taken drugs for procure abortions. In one such case, an unmarried young girl died of chloroquine poisoning. The usefulness of seminars and conferences held for doctors, estate medical assistants, nurses and teachers cannot be evaluated quantitatively. The knowledge and awareness of toxicity of various chemicals, envenomations, first aid and treatment must have helped to reduce the rising morbidity and mortality from poisoning.

Reduction of suicides and attempted suicides by poisoning is a difficult problem. It has been suggested that restricting the availability of pesticides would reduce the overall rate of suicide, as happened in England when carbon monoxide was eliminated from coal gas(34). This may not be practical in Sri Lanka as restrictions are likely to affect the agricultural production adversely. One specific action that can be taken to reduce morbidity and mortality from poisoning is to improve the treatment facilities in state hospitals. It was shown for example, that the mortality from pesticide poisoning is unacceptably high, varying from 8.9% to 11.7% in the eighties. Lack of essential drugs and other equipment in hospitals seems to be a major problem.

Morbidity and mortality from poisoning will increase causing a tremendous burden to health services in the country. Poisoned patients will require expensive antidotes such as pralidoxime, dicobalt edetate and antivenom. They need treatment in intensive care units, which cost several thousand rupees per patient per day. The cost of poisoning to the health sector has not been properly assessed. One study has shown that Rs. 3875 is required to manage a patient with organophosphate poisoning(35). Another study calculated that Rs. 1448 is required for a snake bite victim(36). These are hospital costs for medicines, investigations and staff time only. Infrastructure costs, cost to the patient and the family by way of direct costs and indirect costs due to loss of productivity have not been included. If one considers the calculated amounts mentioned above, in 1998 for the management of patients with organophosphorus poisoning hospitals spent Rs. 58,020,375 and for snake bite victims Rs. 48,662,936. Considering an average of Rs. 1500 for other poisoning cases, the total hospital expenditure was nearly Rs.153 million.

In 1993, recognising the gravity of the problem of pesticide poisoning, the Presidential Task Force on Formulation of a National Health Policy suggested the following measures(37). Some of these measures can be used to prevent poisoning from other chemicals as well.

- * Strengthening the implementation of the provisions under Control of Pesticides Act

No. 33 of 1980, by appointing Public Health Inspectors as authorised officers with powers of inspection, obtaining samples, etc.

- * Undertaking information, education and communication programmes for pesticide users and the general public. Agricultural extension workers, health workers, mass media, producers and suppliers will be involved. Emphasis will be given to adverse effects of pesticide use and safe handling methods in transportation and application of pesticides.
- * Ensuring the use of safety measures and protective equipment against accidents and pesticide poisoning through an appropriate pricing and distribution mechanism.
- * Encouraging community involvement and popular participation in surveillance of the use of pesticides and safety measures.
- * Introducing pesticide epidemiology and toxicology in the curricula of medical officers and public health inspectors to analyse, prevent and cure health problems caused by the use and abuse of pesticides.
- * Strengthening the National Poisons Information Centre.

The last recommendation, that is strengthening the NPIC can provide

- a) an efficient 24 hour service for health care professionals and doctors
- b) a laboratory back up service to analyse blood, urine and stomach contents to assist doctors in the management of poisoned patients
- c) facilities to supply antidotes to hospitals

These three activities alone can help to reduce the rising incidence of morbidity and mortality from poisoning.

For example, lack of laboratory facilities in the NPIC as well as in hospitals is costly. When a patient who has ingested organophosphorus or carbamate is admitted to a hospital, determination of cholinesterase levels in blood can predict whether the systemic poisoning is absent, mild or severe. Then the doctor can decide to discharge the patient, reducing bed occupancy and money, or treat the patient according to the severity of the poisoning rather than blindly. Knowing the paraquat or paracetamol levels in blood can also help doctors to either discharge the patients or plan future management. It is high time that the state and all other concerned parties take effective action to reduce the rising morbidity and mortality from poisoning. The lone struggle of the underfunded, understaffed NPIC will not be adequate.

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Table 1.
Leading causes of hospital deaths-1998

	Deaths	Mortalityrate
1. Ischaemic heart disease	3183	9.5
2. Disease of the gastrointestinal tract	3172	9.4
3. Poisoning	3034	9.1
4. Pulmonary heart disease and diseases of the Circulation	2965	8.8
5. Cerebrovascular diseases	2880	8.6
6. Neoplasms	2269	6.7

(This data exclude deaths from Mullaitivu and Mannar Districts)

Table 2.
Hospital admission and deaths from poisoning - 1998

	TotalHospital Admissions	Hospital Deaths	CaseFatality Rate
Organophosphates and Carbamates	14973	1440	9.6 %
Other Pesticides	6456	810	12.5 %
Medicinal Agents	10813	191	1.8 %
Snake Bites	33607	169	0.5 %
Other Poisoning and Toxic Effects	14205	424	3.0 %
Total	80054	3034	3.8 %

Table 3 -
Purpose of enquiry

Purpose of Enquiry	Number	%
Enquiries on Management of poisoned patients	3740	91.89
Enquiries for information poisons	253	6.22
Enquiries on previous calls	62	1.52
Enquiries on poisoned animals	15	0.37
Total	4070	100.00

**Table 4 -
Category of interlocutor (Enquirer)**

Source of enquiries	Numberof enquiries	%
Medical officers / Physicians	3541	87.00
Other Specialists	60	1.48
Nurses	51	1.25
Para-medical personnel	09	0.22
Relative / Friend of a patient	197	4.84
Members of the public	25	0.62
Other Governmental Authority	09	0.22
Others	26	0.64
Industrial / Commercial Representative	16	0.39
Victim	114	2.80
Social worker	01	0.03
Veterinary doctor	03	0.07
Teacher / Educator	03	0.07
Journalist	04	0.10
Police	05	0.12
Occupational Health Worker	02	0.05
Laboratory Analyst	01	0.03
Poison Centre Specialist	03	0.07
Total	4070	100.00

**Table 5 -
Distribution of calls by time**

Time	Number	%
6.00 am - 8.00 am	16	0.40
8.00 am - 12.00 noon	1452	36.03
12.00 noon - 3.00 pm	924	22.93
3.00 pm - 5.00 pm	882	21.88
5.00 pm - 8.00 pm	357	8.86
8.00 pm - 12.00 midnight	366	9.08
12.00 midnight – 6.00 am	33	0.82
Total	4030	100.00

**Table 6 -
Distribution of patients by agent**

Agent	Number of enquiries	%
Pharmaceuticals	750	20.05
Veterinary products	11	0.29
Industrial/commercial products	577	15.43
Household/leisure products e.g. bleaches	313	8.37
Cosmetics/personal hygiene products	46	1.23
Pesticides	1263	33.77
Agrochemicals other than pesticides	37	0.99
Substances used for abuse	15	0.40
Plants	284	7.59
Mushrooms	14	0.38
Snake venom	80	2.14
Other animals (stings bites)	65	1.74
Food and beverages	19	0.51
War fare/ anti-riot agents	05	0.13
Environmental Contaminants	01	0.03
Miscellaneous	105	2.81
More than one agent	73	1.95
Unknown	82	2.19
Total	3740	100.00

**Table8-
Distribution of patients by age**

Age	Number	%
0 – 2 years	361	9.65
3 – 4 years	216	5.78
5 – 9 years	132	3.53
10 – 14 years	143	3.82
15 – 19 years	471	12.59
20 – 29 years	915	24.47
30 – 39 years	468	12.51
40 – 49 years	202	5.40
50 – 59 years	116	3.10
60 – 69 years	59	1.58
70 and more	26	0.70
Unknown adult	200	5.35
Unknown child	11	0.29
Unknown	255	6.82
More than one patient	165	4.41
Total	3740	100.00

**Table 7 -
Distribution of patients by sex**

Sex	Number	%
Male	1837	49.12
Female	1393	37.24
Other	164	4.39
Not recorded	346	9.25
Total	3740	100.00

(Others - more than one patient)

**Table 9 -
Distribution of patients by circumstance**

Circumstance	Number	%
Accidental	1202	32.14
Suicidal	1823	48.74
Occupational	72	1.93
Homicidal	46	1.23
Other	146	3.90
Unknown	451	12.06
Total	3740	100.00

Table 10 - Cases of poisoning analysed by route of exposure

Route	Number	%
Oral	3177	84.95
Inhalation	106	2.83
Dermal	189	5.05
Eye contact	09	0.24
Vaginal	00	0.00
Rectal	01	0.03
Other	04	0.11
Unknown	219	5.85
More than one route	35	0.94
Total	3740	100.00

Table 11 - Severity of symptoms and signs

Symptoms severity	Number	%
Not known	341	9.12
No symptoms	790	21.12
Mild symptoms	1214	32.46
Moderate symptoms	982	26.25
Severe symptoms	384	10.27
Death	19	0.51
Other	10	0.27
Total	3740	100.00

(Table 10 - Other - Intramuscular and intravenous administrations)

(Table 11 - Other - Where more than one patient was involved and those patients were presented with more than one symptom severity).

Table 12 - Outcome

Outcome	Number	%
Recovered	2658	71.07
Death	299	7.99
Already dead	32	0.86
LAMA	144	3.85
Unknown	591	15.80
Other	16	0.43
Total	3740	100.00

LAMA - Left against medical advice

Other - Where more than one patient or a group of patients were involved.

Table 13 - Hospital admission and deaths from snake bites 1987-1996

Year	Admissions	Deaths
1987	5665	134
1988	6750	163
1989	7343	144
1990	7735	114
1991	12175	163
1992	17064	182
1993	20066	166
1994	20705	159
1995	25912	190
1996	27251	164
Total	150666	1579

DIPLOMA IN FORENSIC MEDICINE AND SCIENCE/MASTER OF SCIENCE (FORENSIC MEDICINE) 2000

1. Describe the value of scientific evidence in cases of sexual assaults. (100 marks)
2. Ten males were found dead in a house with multiple firearm and explosive injuries. Describe the value of scientific evidence in the investigation. (100 marks)
3. Discuss the use of Xray techniques in forensic medicine. (100 marks)
4. A 46 year old patient who was operated for acute appendicitis dies during anaesthesia. Discuss the likely causes of death and the defences available to the doctors (Surgeon and anaesthetist) who are sued for medical negligence. (100 marks)
5. Discuss the role of an expert medical witness for the defence in a case of alleged homicide of a 17 year old girl by hanging. (100 marks)
6. Critically analyse whether the following laws should be amended or not.
 - (A) Laws relating to abortion (50 marks)
 - (B) Laws relating to sexual offences (50 marks)
7. Describe briefly the role of the forensic pathologist in the following circumstances:
 - (A) In cases of infanticide (25 marks)
 - (B) Examination of a scene of alleged homicide by firearm injuries (25 marks)
 - (C) Autopsy examination of a body found in a burnt house (25 marks)
 - (D) Examination of an alleged assailant of rape (25 marks)
8. Discuss how the investigation of deaths (Coroner system) in Sri Lanka can be improved.
9. Discuss the value of examining blood and blood stains in cases of
 - (A) Homicide (50 marks)
 - (B) Sexual assaults (50 marks)
10. Discuss the role of doctors in cases of child abuse. (100 marks)