



# AMERICAN JOURNAL OF PHARMTECH RESEARCH

Journal home page: <http://www.ajptr.com/>

## Poison Information Resources: Its Role In Prevention And Management of Poisoning

Shanmuga Sundaram R<sup>1\*</sup>, Reshma UR<sup>2</sup>, Venkat Paluri<sup>2</sup>.

1. Department of Pharmacology, J.K.K Nattaraja College of Pharmacy,  
Komarapalayam, Tamilnadu, India-638183.

2. Department of Pharmacy Practice, J.K.K Nattaraja College of Pharmacy, Komarapalayam,  
Tamilnadu, India-638183.

### ABSTRACT

Poisoning is a significant global public health problem. Every year, approximately half a million people die world-wide due to poisoning. Immediate poisoning information and management in the early diagnosis, treatment, management, prevention and hazards management of poisoning is provided by specialized unit, Poison Information Center (PIC) through well trained poison information specialist. Poison information service (PIS) also deals with the risk assessment, diagnosis, management and prevention of exposure to any poison, in patients of any age irrespective of type (intentional or accidental) and route of exposure. The effective functioning of a PIC depends on the availability of an adequate volume of evaluated data to furnish a basis for the advice given. A timely provision of poisoning information is appropriate for the poison management which is provided by Poison Information Services as per the needs of the enquirer. Poison information resources are of different types including primary, secondary, tertiary resources. Secondary sources such as Poisindex, Hypertox, Intox and Toxinz are must for the retrieval of quick and updated information. Many of the countries have their own databases for the products available in their region. Thus Poison information resources plays a crucial role in the prevention and management of poisoning cases through provision of information to general public and also to healthcare professionals.

**Keywords:** Poison Information Center (PIC), PIS, Poison information resources (PIR), Poison information databases (PID)

\*Corresponding Author Email: [malshan34@gmail.com](mailto:malshan34@gmail.com)

Received 21 July 2014, Accepted 18 August 2014

Please cite this article as: Shanmuga Sundaram R *et al.*, Poison Information Resources: Its Role In Prevention And Management of Poisoning. American Journal of PharmTech Research 2014.

## INTRODUCTION

Poisoning is a significant global public health problem. Every year, approximately half a million people die world-wide due to poisoning.<sup>1,2,3</sup> Since the middle of the 20<sup>th</sup> century, an ever increasing number of chemicals have been used for improving agricultural output and the manufacture of pharmaceutical and household products. The availability of these products has no doubt improved the quality of life but has also led to unintentional occupational and environmental exposures. India faced the worst industrial disaster due to methyl isocyanate in December 1984 at Bhopal.<sup>4</sup> In South India, the exact number of toxic exposures is not known as there is no centralized reporting system. Studies published on hospital-based poisoning data from different parts of the state are the only source of information<sup>5</sup>

Immediate poisoning information and management in the early diagnosis, treatment, management, prevention and hazards management of poisoning is provided by specialized unit, PIC through well trained poison information specialist.<sup>6</sup> Poison information (PI) refers to the information about the toxic effects of chemicals, hazardous material spills, house hold products, over dose of therapeutic medicines, plants including mushroom, animal toxins by bites of snake, spider and other venomous creatures and stings.<sup>7</sup>

Poison information service also deals with the risk assessment, diagnosis, management and prevention of exposure to any poison, in patients of any age irrespective of type (intentional or accidental) and route of exposure. The primary aim of PIC is to reduce the morbidity and mortality due to poisoning and improve the patient's quality of life.<sup>7,9</sup> Reduction in the poisoning treatment cost to the patients is one of the goals of poison information centers.<sup>10</sup> A timely provision of poisoning information is appropriate for the poison management which is provided by PISs as per the needs of the enquirer.<sup>6,8</sup>

The PIC may act as the focal point for action in case of chemical accidents and should be prepared to provide adequate information rapidly in the acute phases. When building up toxicological data banks, centers should therefore include information on all chemicals likely to be involved in accidents in the region, not forgetting the less frequently used industrial chemicals and reactive intermediates.<sup>12</sup>

### **NEED FOR POISON INFORMATION CENTER (PIC)**

Poisoning is a significant global public health problem.<sup>11</sup> Nearly, a million people die each year as a result of suicide, and chemicals account for a significant number of these deaths. It is estimated that deliberate ingestion of pesticides causes 370,000 deaths each year.<sup>12</sup> A global study undertaken

during the period 1984-1986 indicated that, while most developed countries had well established facilities for poison control, this was rarely the case in developing countries. Furthermore, in industrialized countries, there may be a number of institutions that provide different types of information on toxic chemicals. It must be remembered, however, that each ministry or agency in a developed country may have its own information services for its specialized needs, but that, in a developing country, the PIC - where it exists - may be the only source of information on toxic chemicals available 24 hours a day.<sup>11</sup>

According to World Health Organization (WHO) data, in the year 2004, an estimated 346,000 people died worldwide from unintentional poisoning. Of these deaths, 91% occurred in low and middle income countries.<sup>12</sup> Centers in developing countries may therefore have to provide a much broader toxicological information service than their counterparts in some developed countries.<sup>11</sup> Poison information centers may operate effectively with various types of organizational structure. The majority depends on a hospital administration and are, to some extent, connected with a university and with the country's public health service at national or regional level. Close association with units that treat poisoned patients and with analytical laboratories are essential to most centers, although the way in which this is organized depends on local conditions.

Many centers are multifunctional, providing an information service, clinical unit, and analytical laboratory. Most are at least partially supported by public funding, and operate as independent foundations with their own governing bodies on which various public authorities are represented. It is thus impossible to specify a single organizational model for a PIC.<sup>11</sup> The incidences of poisoning are high and it is one of the major causes of death in India.<sup>14</sup> Poisoning cases are treated at different levels of health care facility including government and private settings. However, owing to lack of PIS, management of acute poisoning cases is a difficult task to physicians working in emergency departments of Indian hospitals.<sup>15</sup> PICs provide such information and are an essential part of a country's capacity for ensuring the safety of chemical substances.

A poison information service should be available in every country, irrespective of its size or population. Ideally, there should be one national center with, if necessary, a series of regional satellite centers. In a large country, or one with a large population or several different language groups, a number of regional centers may be needed, with close collaboration between them. Generally speaking, a PIC should serve a population of 5-10 million, but a proliferation of centers should be avoided.<sup>13</sup> Depending on the availability of other services that provide information on toxic chemicals, a poison information center may have to advise on a wide range of problems, and

its associated facilities, e.g. laboratory services, may have to be multifunctional.

The effective functioning of a PIC depends on the availability of an adequate volume of evaluated data to furnish a basis for the advice given. Two categories of data are collected: those derived from various external sources, including other centers, as well as scientific journals, textbooks, reports, and data sheets; and those obtained in the course of the centre's information work and its follow-up of reported poisoning cases.<sup>13</sup>

Thus PICs plays a crucial role in the prevention and management of poisoning cases through provision of information to general public and also to healthcare professionals.<sup>16,17</sup> Moreover PIC should develop policies for personnel, method of operation, documentation of service and quality assurance program, staff training, confidentiality, ethical and legal aspects.<sup>18</sup>

### **POISON INFORMATION RESOURCES (PIRs)**

In India, there are only four WHO recognized centers established till date. In addition there are few other centers that offer the poison information through clinical pharmacy service. First National PIC was established in February 1995 at the All India Institute of Medical Sciences (AIIMS), New Delhi.<sup>6</sup> PIRs are of different types including primary, secondary, tertiary resources.<sup>19</sup> It is essential to have all type of resources to provide information. Poison information specialist should have searching and evaluation skills in all type of resources to provide correct and relevant information.<sup>20</sup>

Tertiary resources include the standard textbooks of medicine (general and pediatric), chemistry, pharmacology, analytical toxicology and animal and plant toxins of the region and standard medical dictionaries are essential. List of the medicines, agricultural and other chemical products and their ingredients available in the local market and also the local pharmacopoeia should also be present.<sup>21</sup>

**Table 1. Poison information resources required in a tertiary hospital**

<b>Sl.No</b>	<b>Minimum tertiary poison information resources required</b>
1	Lindsay Murray, Frank Dary, Mark Little, Mikes Cadogan. editors., Toxicology handbook. Australia: Churchils Livingstone, Elsevier; 2007.
2	Richard C drat, Katherine, Hurlbut, Edwin, Kuffur, Luke Yip. The 5 minute Toxicology consult., current edition. Philidelphia: Lippincott Williams and Wilkins; 2001.
3	Timothy B Erickson, William R Athrens, Steven E AK, Cart, K Baun, Louis J Ling.. editors., Pediatric toxicology diagnosis and management of the poisoned child. USA. Mcgraw-Hill; 2005.
4	Kent, Olson. editors., Poisoning and drug overdose. Mcgraw–Hill companies. 2004.
5	Oserhoudt, Perrone, Derros, Henvetic. editors., Toxicology pearls: Philidelphia. Hanley & Belfus.2004.
6	Ellenhorn MJ, Schonwald S, Ordog G, Wasserberg J. editors., Elenhorns medical toxicology diagnosis and treatment of human poisoning current edition, Baltimore: Williams and Wilkins; 2006.
7	Baselt RC, Cravey RH. Disposition of toxic drugs and chemicals in man,

- 3rd ed. Chicago, Year Book Medical, 1989.
- 8 Dreisbach RH, Robertson WO. Handbook of poisoning: prevention, diagnosis and treatment, 12th ed. Los Altos, CA, Appleton & Lange, 1982.
  - 9 Goldfrank LR et al. eds. Goldfrank's toxicologic emergencies, 5th ed. Norwalk, CT, Appleton & Lange, 1994.
  - 10 Indian Pharmacopoeia, 5<sup>th</sup> ed. 2007.
  - 11 United States of Pharmacopoeia 36 - National Formulary 31. 2013.
  - 12 British National Formulary, 66 edn. 2010.
  - 13 Gossel TA, Bricker JD. Principles of clinical toxicology, 3rd ed. New York, Raven Press, 1984.
  - 14 Gosselin RE, Smith RP, Hedge HC. Clinical toxicology of commercial products, 5th ed. Baltimore, MD, Williams & Wilkins, 1984.
  - 15 Haddad LM, Winchester JF, eds. Clinical management of poisoning and drug overdose, 2nd ed. Philadelphia, Saunders, 1990.
  - 16 Klaassen CD, ed. Casarett and Doull's toxicology: the basic science of poisons, 5th ed. New York, McGraw-Hill, 1996.
  - 17 Noji EK, Kelen GD, eds. Manual of toxicologic emergencies. Chicago, Year Book Medical, 1989.
  - 18 Clayton GD, Clayton FE, eds. Patty's industrial hygiene and toxicology, Vols 2A, 2B, 2C, 2D, 2E, 2F, 4th ed. New York, Wiley, 1993-1994.

Secondary sources such as Poisindex, Hypertox, Intox and Toxinz are must for the retrieval of quick and updated information. Many of the countries have their own databases for the products available in their region. However, the countries which do not have such databases can select the specific and relevant database which fulfills their needs. Many databases are available both on line and on compact disc format (CDROM).<sup>22</sup>

**Table 2. Minimum secondary poison information resources required**

Sl.No	Minimum secondary poison information resources required
1	Poisindex
2	Hypertox
3	Toxbase
4	Intox
5	Toxinz
6	Toxline
7	Toxnet
8	Toxicon

Primary resources include journals of medicine and toxicology, for the updated and recent advances in a particular area. Apart from these resources it is important to develop educational material such as posters on the safe use of pesticides and chemicals, booklets and leaflets on safe storage of medicines and house hold products at home, and the treatment protocols of the most common type of poisoning for clinicians.<sup>20</sup>

**Table 3. Primary poison information resources required**

<b>Sl.No</b>	<b>Minimum primary poison information resources required</b>
1	British journal of industrial medicine, Published by British Medical Association, London, England.
2	Drug safety (formerly Medical toxicology), Published by ADIS Press, Auckland, New Zealand.
3	EHP (Environmental health perspectives), Published by US Department of Health and Human Services, National Institute of Environmental Health Sciences, Research Triangle Park, NC, USA.
4	Human and experimental toxicology, Published by Macmillan, Basingstoke, England.
5	Adverse drug reactions and toxicological reviews, Published by Oxford University Press, Oxford, England.
6	American journal of industrial medicine, Published by Wiley, New York, NY, USA.
7	Annals of occupational hygiene, Published by Pergamon, Elmsford, NY, USA.
8	Archives of environmental contamination and toxicology, Published by Springer Verlag, New York, USA.
9	Archives of environmental health, Published by Heldref (Helen Dwight Reid Educational Foundation), Washington, DC, USA.
10	Archives of toxicology, Published by Springer Verlag, Berlin, USA.
11	Biochemical pharmacology, Published by Pergamon, Elmsford, NY, USA
12	Journal of the American Industrial Hygiene Association, Published by American Industrial Hygiene Association, Akron, OH, USA.
13	Journal of toxicology - clinical toxicology, Published by Marcel Dekker Inc., New York, NY, USA.
14	Pharmacology and toxicology, Published by Munksgaard, Copenhagen, Denmark.
15	Neurotoxicology, Published by Raven Press, New York, USA.
16	Toxicology, Published by Elsevier, Limerick, Ireland.
17	Toxicology letters, Published by Elsevier, Amsterdam, Netherlands.
18	Toxicology and applied pharmacology, Published by Academic Press, San Diego, CA, USA.
19	Toxicon, Published by Pergamon, Elmsford, NY, USA.
20	Veterinary and human toxicology, Published by Comparative Toxicology Laboratories, Manhattan, KS, USA.

### **POISON INFORMATION DATABASES**

PIS was originally provided by telephone, but with increasing numbers of calls, many about relatively straightforward poisons, a decision was made in Scotland in the early 1980s to use the then new technology of View data to provide a computer information database to health professionals. This service went on line in 1983 and provided first line information about the management of poisoning to registered NHS users.<sup>23</sup>

### **TOXINZ:**

It is the premier poisons information database in the world. With more than 190,000 chemicals and chemical products, pharmaceuticals, plants and hazardous creatures, TOXINZ is the tool of choice for health-care professionals in the ER, direct response units, poison control centers, pharmacies

and universities.<sup>24</sup> It include 6,500 treatment protocols, 30,000 pharmaceuticals, 160,000 commercial and household products, Intervention criteria including observation period and admission criteria, signs and symptoms, drug toxicity and therapeutic drug information. Its references are hyperlinked to pubmed. It contain images to identify plants and animals.<sup>32</sup>

### TOXBASE:

TOXBASE, subsequently became the first line poisons information database of the National Poisons Information Service (NPIS) for the whole of the UK. Since its inception TOXBASE has been available free of charge to registered users within the National Health Service, and by 1999 contained information on approximately 12,000 substances and products. In addition a number of monographs had been written for TOXBASE on specific aspects of poisons management such as pediatric poisoning, slang drug names and poisoning in pregnancy.<sup>25</sup> TOXBASE has been extensively accessed since being placed on the internet (<http://www.spib.axl.co.uk>). The pattern of enquiries mirrors clinical presentation with poisoning. The system seems to be easily used. It is a model for future delivery of treatment guidelines at the point of patient care.<sup>26</sup>

**Table 4. List of some important toxicology databases**

Toxicology databases	Links
Poisons Information Database:	<a href="http://vhp.nus.sg/PID">http://vhp.nus.sg/PID</a>
Poisons Information Database: (Alternative Site)	<a href="http://medweb.nus.sg/PID?PID.html">http://medweb.nus.sg/PID?PID.html</a>
Development and Reproductive Toxicology Database:	<a href="http://www.nlm.nih.gov/pubs/factsheets/dartfs.html">http://www.nlm.nih.gov/pubs/factsheets/dartfs.html</a>
Pollution and Toxicology Database:	<a href="http://www.library.yale.edu/scilib/help/poltox.html">http://www.library.yale.edu/scilib/help/poltox.html</a>
Toxic Plant Database:	<a href="http://www.library.uiuc.edu/vex/toxic/comlist.html">http://www.library.uiuc.edu/vex/toxic/comlist.html</a>
Poisonous Plant Database:	<a href="http://www.wam.urnd.edu/-met/Plants/poisonous.html">http://www.wam.urnd.edu/-met/Plants/poisonous.html</a>
FDA/CFSAN Poisonous Plant Database:	<a href="http://vm.cfsan.fda.gov/-djw/readme.html">http://vm.cfsan.fda.gov/-djw/readme.html</a> <a href="http://vm.cfsan.fda.gov/djw/readme.html">http://vm.cfsan.fda.gov/djw/readme.html</a>
OSHA database	<a href="http://www.infoventures.com/e-hlth/">http://www.infoventures.com/e-hlth/</a>
TOXNET Home:	<a href="http://toxnet.nlm.nih.gov/">http://toxnet.nlm.nih.gov/</a>
Toxicology Data NET work:	<a href="http://www.nlm.nih.gov/pubs/factsheets/toxnetfs.html">http://www.nlm.nih.gov/pubs/factsheets/toxnetfs.html</a>
Reprotox:	<a href="http://www.reprotox.org/">http://www.reprotox.org/</a>
NLM's Databases & Electronic Information Sources:	<a href="http://www.nlm.nih.gov/databases/databases.html">http://www.nlm.nih.gov/databases/databases.html</a>
Poltox 1-Pollution and Toxicology:	<a href="http://www.silverplatter.com/catalog/ptxa.html">http://www.silverplatter.com/catalog/ptxa.html</a>
TOXLINE <sup>R</sup> Database	<a href="http://www.ccohs.ca/products/databases/toxline.html">http://www.ccohs.ca/products/databases/toxline.html</a>
Toxicology and poisoning Databases. Search engines	<a href="http://www.internets.com/mednets/toxicology.html">http://www.internets.com/mednets/toxicology.html</a>
Poison Database:	<a href="http://www.alert-pest.net/poison.html">http://www.alert-pest.net/poison.html</a>
Toxicology Home	<a href="http://www.medfarm.unito.it/toxicol/toxivcoll.html">http://www.medfarm.unito.it/toxicol/toxivcoll.html</a>
Pharmacology & Toxicology	<a href="http://www.mic.ki.se/PharmTox.html">http://www.mic.ki.se/PharmTox.html</a>

**HYPERTOx:**

It is a software that can be used for emergency management and training in toxicology. Three versions are available - for the web, for the PDA and the PC version. The trial version is free and can be used for 30 days.<sup>27</sup>

**TOXNET:**

This is a comprehensive website on toxicology and hazardous chemicals from the National Institutes of Health, USA. The website contains toxicology fact sheets, antidotes against a large collection of toxins, training manuals and a separate section on household poisons.<sup>28</sup>

**HSDB:**

It is Hazardous Substances Data Bank. Moreover it is peer-reviewed toxicology data for over 5,000 hazardous chemicals.

**TOXLINE:**

It contains 4 million references to literature on biochemical, pharmacological, physiological, and toxicological effects of drugs and other chemicals.

**ChemID plus:**

It is a dictionary of over 370,000 chemicals (names, synonyms, and structures).<sup>31</sup>

**TOXICON:**

It is a website of a medical toxicology consortium. This site contains a section on virtual toxicology cases, a toxidrome review, and antidotes to common poisons and links to toxicology sources on the web.<sup>29</sup>

**POISINDEX:**

It is a part of Micromedex, (Toxicology Management Solution from Truven Health Analytics™, the Micromedex). POISINDEX® System is a trusted, evidence-based resource to help identify, manage, and treat toxicological exposures. POISINDEX identifies ingredient and toxic substance information on 350,000+ commercial products, chemicals, drugs, toxic plants, and animals. This resource includes information on current products as well as products that have been discontinued.<sup>30</sup> It is quarterly updated and contains no image of plants or animals to identify.<sup>32</sup>

POISINDEX links the ingredient and substance information directly to details to assist in the management of all toxic exposures, providing data on clinical effects, range of toxicity, and treatment protocols for exposure. The system also delivers concise, essential toxicology data on a single screen to ensure the fastest access to vital information. Plus, it is the only system to link to additional databases, including:

- **Hazardtext** for incidents such as spills, leaks, fires, or explosives involving hazardous materials.
- **Meditext** to assist in evaluating and treating acute exposures to industrial chemicals, reporting potential adverse health effects, and treating chemical release exposures.<sup>30</sup>

## CONCLUSION:

PICs reduce the morbidity and mortality due to poisoning and improve the patient's quality of life. Reduction in the poisoning treatment cost to the patients is one of the goals of poison information center (PICs). The PIC may act as the focal point for action in case of chemical accidents and should be prepared to provide adequate information rapidly in the acute phases. When building up toxicological data banks, centers should therefore include information on all chemicals likely to be involved in accidents in the region, not forgetting the less frequently used industrial chemicals and reactive intermediates. In India, there are only four WHO recognized centers established till date.

The effective functioning of a PIC depends on the availability of an adequate volume of evaluated data to furnish a basis for the advice given. First National PIC was established in February 1995 at the All India Institute of Medical Sciences (AIIMS), New Delhi. Poison information resources are of different types including primary, secondary, tertiary resources. Secondary sources such as Poisindex, Hypertox, Intox and Toxinz are must for the retrieval of quick and updated information. A timely provision of poisoning information is appropriate for the poison management which is provided by PISs as per the needs of the enquirer. Thus PICs play a crucial role in the prevention and management of poisoning cases through provision of information to general public and also to healthcare professionals.

## REFERENCE:

1. Churi S, Harsha CS & Ramesh M. Patterns of poison information queries received by a newly established south Indian PIC. *Asian J Pharm Clin Res.* 2012; 05: 79-82.
2. Harish D, Chavali K, Singh A, Kumar A. Recent advances in the management of poisoning cases. *J Indian Acad Forensic Med.* 2011; 33:74-9.
3. Sharma BR, Harish D, Sharma V & Viji K. Poisoning in northern India: Changing trends, causes and prevention thereof. *Med Sci Law.* 2002; 42:251-7.
4. Aruna D. Medical toxicology: Need for recognition as a subspecialty. *Indian J Pharmacol.* 2011; 3 (1): 1-2.
5. Jesslin J, Adepu R & Churi S. Assessment of Prevalence and Mortality Incidences Due to Poisoning in a South Indian Tertiary Care Teaching Hospital. *Indian J Pharm Sci.* 2010; 72(5):

- 587–591.
6. Lall SB, Peshin SS. Role and functions of poison information centre. *Indian J Peadiatr.* 1997; 64:443-9.
  7. Kranzalok EP. International poison information centre data collection capabilities. *Vet Human Toxcol.* 1995; 37(3):246-8.
  8. Laborde A. New roles of poison control centres in the developing countries. *Toxicol.* 2004;198:273-7.
  9. Sam KG, Rajan MSV, Saghir Z, Kumar P, Rao P. Evaluation of PIS of a clinical pharmacy department in a south Indian tertiary care hospital. *J Clin Diagnostic Res.* 2009;3:1313-8.
  10. Ponampalam R, Loh CS. Cost benefits of the Drug and Poison Information Centre in preventing unnecessary hospitalization: the Singapore experience. *Hong Kong J Emerg Med.* 2010;17:45-53.
  11. Report of the survey of poison control centres and related toxicological services 1984-1986. *J de Toxicologie Clinique Etexpérimentale.* 1988;8(5):313-371.
  12. World Health Organization. Poisoning prevention and management [Online]. Available from: URL : <http://www.who.int/ipcs/poisons/en/>. Accessed May, 2014.
  13. Batra AK, Keoliya AN, Jadhav GU. Poisoning: An unnatural cause of morbidity and mortality in rural India. *JAPI.* 2003; 51:955-959.
  14. Aggarwal P. Need for PIS in India. *Natl Med J India* 1995; 8(1):47-49.
  15. Raymond W, Roberts, Russell WL. A Pharmacist based toxicology service. *Ann Pharmacother.* 2007;41:1719-24.
  16. Peter AC. Pharmacist as clinical toxicologist: reflection on evolution, challenges and opportunities. *Ann Pharmacother.* 2007;41:1708-11.
  17. Tong TG, Becker CE, Foliart D, Morse L. A model poison control system. *West J Med.* 1982;137:346-50.
  18. Persson H, Tempowski J. Developing and maintaining quality in PICs. *Toxicol.* 2004;198:263-6.
  19. Kearney TE, Hiatt PH, Olson KR. Alternative models for telephone response to pediatric poisoning. *Prehosp Emerg Care.* 2007; 11(3): 284-92.
  20. Parthasarathi G, Mahesh PA. Drug information resources. In: Parthasarathi G, Nyfort-Hansen K, Nahata MC, editors. *A text book of clinical pharmacy practice.* Chennai: Orient Longman Private Limited; 2004. p. 16.

21. Shobha C, Ramesh M, Parthasarathi G. PIC-An Overview of its Significance, Organization and Functioning. Ind J Pharmacy Pract. 2011; 4(4): 14-20.
22. Proudfoot AT, Davidson WSM. A View data system for poisons information. BMJ. 1983; 286: 1125-7.
23. Pal SK, Nazir A, Mukhopadhyay I, Saxena DK. Internet: A major resource for toxicologist. Indian J Exp Biol. 2001; 39: 1207-13
24. What is TOXINZ? Available from URL: [http://support.epnet.com/knowledge\\_base/detail.php?topic=953&id=6853&page=1](http://support.epnet.com/knowledge_base/detail.php?topic=953&id=6853&page=1). Accessed May, 2014.
25. Good AM, Bateman DN. TOXBASE on the internet. J Accid Emerg Med. 1999;16:399.
26. Bialas MC, Evans RJ, Hutchings AD, et al. The impact of nationally distributed guidelines on the management of paracetamol poisoning in accident and emergency departments. J Accid Emerg Med. 1998; 15: 13-17.
27. Hypertox. Available from URL: [www.hypertox.com](http://www.hypertox.com). Accessed May, 2014.
28. Toxnet. Available from URL: <http://toxnet.nlm.nih.gov>. Accessed May, 2014.
29. Toxicon multimedia project. Available from URL: <http://www.uic.edu/com/er/toxikon/>. Accessed May, 2014.
30. POISINDEX System Expansion. Available from URL: <http://truvenhealth.com/global/global-mdx-poisindex>. Accessed May, 2014.
31. TOXNET Databases. Available from URL: <http://toxnet.nlm.nih.gov>. Accessed May, 2014.
32. TOXINZ. Available from URL: <http://www.ebscohost.com/promoMaterials/TOXINZ>. Accessed May, 2014.

***AJPTR is***

- Peer-reviewed
- bimonthly
- Rapid publication

Submit your manuscript at: [editor@ajptr.com](mailto:editor@ajptr.com)

