ISSN : 2455-2410 (Online), ISSN: 2455-555x (Print)

Original Article

Analysis of the Role of Forensic Science Laboratory (FSL) in Finalizing Cause of Death in Cases of Poisoning

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Abstract

Background: *The incidence of poisoning in India is among the highest in the world: it is estimated that more than 50000 people die every year from toxic exposure. Forensic Science Laboratory plays an important role in detection of type of poison by analysis of viscera but it is also important to remember that chemical analysis reports are not always infallible.*

Methods: *This hospital based prospective cross sectional study was carried out over a period of two years duration at Rural Medical College, Loni and Pravara Rural Hospital, of Pravara Institute of Medical Sciences, Loni to analyze the role of Forensic Science Laboratory in finalizing cause of death in cases of poisoning by detection of type of poison on chemical analysis of viscera. All cases of death due to suspected acute poisoning were included in the study. Comprehensive proforma for the study was designed to collect data from postmortem report and chemical analysis report of viscera. Data was statistically analyzed using statistical software SPSS Statistic 17 and Microsoft Office Excel 2003 in the form of percentage (%) and proportion.*

Results: *Out of 62 fatal cases of acute poisoning where viscera were sent for chemical analysis, reports were received in 45 (72.58%) cases and pending in 17 (27.42%) cases. Out of 45 fatal cases in which chemical analysis reports were received, poisons were detected in 24 (53.34%) cases and not detected in 21 (46.66%) cases. Amongst the detected poisons, most common type of poison was organochlorine 13(54.17%) followed by organophosphorus 7(29.17%).*

Conclusion: *The present study helps to analyze the role of Forensic Science Laboratory in finalizing cause of death in cases of poisoning by detection of type of poison on chemical analysis of viscera.*

Key words: *Forensic Science Laboratory, chemical analysis, acute poisoning.*

Article History : ● Date of submission: 02/02/2016 ● Date of peer review: 02/03/2016 ● Date of acceptance: 20/03/2016

Introduction

It has been estimated that some form of poison directly or indirectly responsible for more than 1 million illnesses worldwide annually, and this figure could be just the tip of iceberg since most cases of poisoning actually go unreported, especially in third world countries. The incidence of poisoning in India is among the highest in the world: it is estimated that more than 50000 people die every year from toxic exposure. In developed countries the rate of mortality from poisoning is as low as 1-2%, in India it varies from shocking 15-30%.In every case of death due to poisoning, an attempt must be made to demonstrate the presence of poison by standardized analytical methods. For this purpose, the pathologist conducting autopsy must collect certain viscera and body fluids, and dispatched through the police to the nearest Forensic Science Laboratory. It is important to remember that chemical analysis reports are not always infallible, and the medical officer would do well consider all other aspects including clinical notes, eye witness accounts, and his own observations at autopsy, before pronouncing the cause of death.[1]

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It is imperative to find out type of poison resulted in death involving acute poisoning, as it will immensely help the health policy makers to reduce the mortality due to poisoning. So the present study is carried out at Pravara Rural Hospital and Rural Medical College of Pravara Institute of Medical Science, Loni to analyze the role of Forensic Science Laboratory in finalizing cause of death in cases of poisoning by detection of type of poison on chemical analysis of viscera.

Objectives

1. To study status (received/pending) of chemical analysis reports.
2. To study status of detection of poison in chemical analysis reports amongst fatal acute poisoning cases.
3. To study type of poison detected in chemical analysis reports amongst fatal acute poisoning cases.

Materials and Methods

This hospital based prospective cross sectional study was carried out over a period of two years duration from 01/09/2008 to 31/08/2010 after approval by Institutional Ethics and Research committee at Rural Medical College, Loni and Pravara Rural Hospital, of Pravara Institute of Medical Sciences, Loni. All cases of death due to suspected acute poisoning including fatal cases of known and unknown bites and stings from all age were included in the study. All cases of chronic poisoning, poisoning cases admitted and referred to other hospitals, absconded cases, brought dead cases without history of acute poisoning, cases admitted without history of poisoning, bites and stings were excluded from the study.

Comprehensive proforma for the study was designed which containing status of chemical analysis reports whether received or pending, status of detection of poison in chemical analysis reports and type of poison detected in chemical analysis reports. Data was statistically analyzed using statistical software SPSS Statistic 17 and Microsoft Office Excel 2003. Data was analyzed in the form of percentage (%) and proportion.

Results

During the period of 24 months from September 2008 to August 2010 total 62 fatal cases of acute poisoning were reported. Out of 62 fatal cases of acute poisoning where viscera were sent for chemical analysis, reports were received in 45 (72.58%) cases and pending in 17 (27.42%) cases. Out of 45 fatal cases in which chemical analysis reports were received, poisons were detected in 24(53.34%) cases and not detected in 21(46.66%) cases. Amongst the detected poisons, most common type of poison was organochlorine 13(54.17%) followed by organophosphorus 7(29.17%).

Discussion

In the present study, 27.42% fatal cases report of chemical analysis of viscera was still not received and was pending. This may be because of shortage of manpower and proper equipment so the reports often get delayed, sometimes for years. However Job C. [2] reported that report of chemical analysis of viscera was pending or not received in only 2.92% cases this may be because of fact that he conducted the retrospective study on the cases in the year of 1995 and reports were analyzed in 2009 so during the period of 14 years most of the reports of chemical analysis of viscera had been received. But as the present study was a prospective study conducted on poisoning cases observed in last two years i.e. September 2008 to August 2010 so pendency of chemical analysis report was more in the present study.

In our study, in 46.66% fatal cases of poisoning, chemical analysis of viscera report was negative i.e. no poison was revealed, which could be due to elimination of poison by vomiting or by stomach wash, faulty preservation or decomposed tissueor may be due to delay in chemical analysis of viscera. Other reason may be that all the poison was neutralized, metabolized or excreted.[3,4] Finding of negative chemical analysis of viscera in 46.66% cases of our study was similar to Job C. [2] who reported no poison to be detected in viscera in 30.58% cases.

In the present study, 54.17% cases were of organochlorine compounds poisoning and 29.17% cases were of organophosphorus compounds poisoning. Most commonly detected poison in the studies done by Job C. [2] was carbamates in 46.80% cases and organophosphorus compounds in 34.4% cases. The difference in type of poison may be due to variations in the use of agrochemicals in the particular regions.

Conclusion

Amongst 62 cases of fatal poisoning chemical analysis report of viscera was pending in 27.42% cases. Amongst 45 cases of fatal poisoning where the chemical analysis report was received, poison was detected in 53.34% cases. Out of 24 cases in which the poison was detected in the chemical analysis, organochlorine compounds were detected in 54.17% cases and organophosphorus compounds in 29.17% cases. The present study helps to analyze the role of Forensic Science Laboratory in

finalizing cause of death in cases of poisoning by detection of type of poison on chemical analysis of viscera. Based on study, it is recommended that all the Forensic Medicine Departments and all the district hospitals must have well established Clinical toxicology laboratories, These laboratories must be well equipped with modern diagnostic facilities and latest treatment techniques so that precious human lives could be saved with early diagnosis and specific treatment of poisoning. The number of centers for chemical analysis of the viscera should be increased to avoid delay in receiving reports.

Acknowledgements

We are deeply acknowledged of Dr. Kalidas D. Chavan (Forensic Medicine), Controller of Examinations, Maharashtra University of Health Sciences, Nashik, Maharashtra.

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Table 1: Distribution of fatal acute poisoning cases according to status (received/pending) of chemical analysis reports

Status of chemical analysis reports	Number (n=62)	Percentage
Received	45	72.58
Pending	17	27.42
Total	62	100

Table 2: Distribution of cases according to status of detection of poison in chemical analysis reports amongst fatal acute poisoning cases

Status of detection of poison in chemical analysis reports	Number (n=45)	Percentage
Poison detected	24	53.34
Poison not detected	21	46.66
Total	45	100

Table 3: Distribution of cases according to type of poison detected in chemical analysis reports amongst fatal acute poisoning cases

Type of poison detected in chemical analysis reports	Number (n=24)	Percentage
Organophosphorus	07	29.17
Organochlorine	13	54.17
Organophosphorus & Pyrethroid Mixed	02	08.33
Ethyl alcohol	02	08.33
Total	24	100

How to cite this article: Datir S, Bangal R. Analysis of the Role of Forensic Science Laboratory (FSL) in Finalizing Cause of Death in Cases of Poisoning. Int J Educ Res Health Sci 2016;2(1): 29-31