

Toxicological Viscera Analysis in India: Current Scenario, Problems & Suggestions- One Year Study of Autopsy Cases Where Viscera Had Been Preserved

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Abstract

Chemical and Toxicological analysis of viscera is conducted in a Medicolegal Death investigation to rule out poisoning/intoxication in the death of the deceased. The analysis is done only in Forensic Science Laboratories established by Indian Government. The Viscera reports are usually received after a period of considerable delay and opinion about the case is kept pending till then. Keeping the same thing into consideration, this study was undertaken to analyze the system of Viscera analysis after autopsy and identifying the factors and problems hampering the timely Chemical Analysis. The study was conducted in Department of Forensic Medicine, All India Institute of Medical sciences, New Delhi. All the Medicolegal Autopsy Cases in the period of one year from 1st January 2013 to 31st December 2013 where viscera was preserved were studied. Data was collected and analyzed from the PM reports and the subsequent viscera reports from FSLs received in the Department till 30th April 2017. The viscera analysis report was received in only 45.5% cases till 30th April 2017 and only 6.2% cases analysis reports were received within six months of conduction of postmortem. Poisons and Drugs were detected in 134 (41.5%) case out of which Ethyl and Methyl Alcohol constitutes 78.6% cases and only in those cases quantification was performed. The reasons of the delay in analysis of viscera and its effects on Medicolegal Death Investigation are discussed. It was concluded that there is a need of establishing Toxicological Laboratories associated with the district hospitals and Medical Colleges where postmortem are being conducted.

Keywords: Toxicology; Poisoning; Viscera; Medicolegal Autopsy; Chemical Analysis.

Introduction

In Medicolegal Autopsy practice viscera is preserved for Toxicological and chemical analysis in poisoning cases, sudden deaths, unclear history or to rule out concomitant poisoning/intoxication [1-4]. The preserved viscera are handed over to the Investigating Officer of the case. The Indian Government has established many Forensic Laboratories controlled by either State or Central Government where the viscera are tested. The report of the Viscera analysis is again sent to the autopsy surgeon by the IO for opinion about the cause of death so as to complete the legal course of the case. A negative viscera report creates a dilemma for the autopsy surgeon when there is no other pathology or injuries found during the postmortem and there is

suspicion of foul play in the case with specific allegations of poisoning. Similarly a false positive report can also raise an unwarranted suspicion in a case. The authors of the study have themselves encountered these problems many times in their course of duties. The Viscera reports are usually received after a period of considerable delay and the case is kept pending till then. Keeping the same thing into consideration, this study was undertaken to analyze the system of Viscera analysis after autopsy and identifying the factors and problems hampering the timely Chemical Analysis.

Material and Methods

The study was conducted in retrospective and prospective manner in the Department of Forensic

Medicine, All India Institute of Medical sciences, New Delhi. All the Medicolegal Autopsy Cases in the period of one year from 1st January 2013 to 31st December 2013 where viscera was preserved were taken for study. Data was collected and analyzed from the PM reports. We further analyzed the subsequent viscera reports from FSLs received in the Department till 30th April 2017 regarding factors like nature of poisons detected, time lag between autopsy & receipt of analysis of reports, quantification of poisons (if detected), number of positives & negative cases etc.

Results and Observations

A total number of 1713 autopsy were conducted in the year 2013 between 1st January 2013 to 31st Dec 2013 and viscera was preserved in 710 (41.4%) autopsy cases (Figure 1).

Out of these 710 cases, the viscera analysis report was received in only 323 (45.5%) cases till 30th April 2017 (Figure 2).

The time duration of submitting the viscera report by the IO in the Department was calculated from the date of the autopsy and their percentage was calculated out of the total 710 cases of Viscera preservation. It was found that the analysis reports were received in only 2.7% cases within three months, in 3.5% cases from three to six months, in 28.6% cases from 6 months to 1 year, in 9.3% cases between 1-2 year and in 1.4% cases after 2 years (Table 1).

The viscera report was still awaited in 54.5% cases. Out of 323 cases in which the report was received, Poisons and Drugs were detected in 134 (41.5%) cases. (Table 2).

Out of 134 positive reports, Ethyl Alcohol was reported in most of the positive cases (67.1%) followed by the combination of Ethyl and Methyl Alcohol (11.2%) and Aluminium Phosphide (6.7%) (Table 3).

One important observation was that the quantification was done in 107 cases out of 134, but all of them consists of ethyl and Methyl Alcohol.

Table 1: Time duration of receiving viscera analysis report from autopsy date

Time duration	Number	Percentage out of total 710 cases of viscera preservation
Within 3 months	19	2.7
3–6 months	25	3.5
6–12 months	203	28.6
1–2 years	66	9.3
More than 2 years	10	1.4
Total	323	45.5

Table 2: Viscera reports positive for poison/drugs

Report positive for poison/drugs	Number	Percentage
Yes	134	41.5
No	189	58.5
Total	323	100.0

Table 3: Types of poisons detected

Poison detected	Number	Percentage	Percentage out of total 710 cases of viscera preservation
Ethyl alcohol	90	67.1	12.6
Ethyl alcohol and methyl alcohol	15	11.2	2.1
Methyl alcohol	2	1.5	0.3
Aluminium phosphide	9	6.7	1.3
Dichlovos	4	3.0	0.6
Organo phosphorus compounds	4	3.0	0.6
Carbon monoxide	1	0.7	0.1
Corrosive acid	2	1.5	0.3
Others	2	1.5	0.3
More than one poison	5	3.8	0.7
Total	134	100.0	18.9

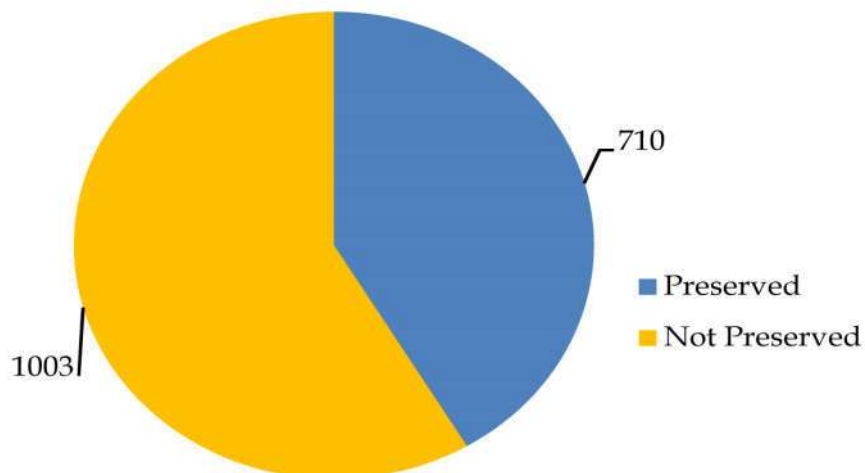


Fig. 1: Percentage of Cases in which Viscera was preserved

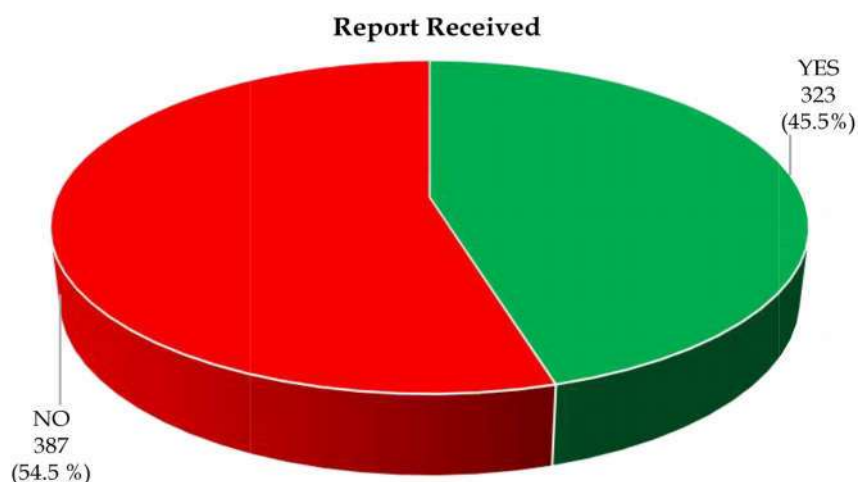


Fig. 2: Percentage of Viscera analysis reports received till 30th April 2017

Discussion

The Department of Forensic Medicine, AIIMS has the jurisdiction for conducting the autopsy of the Medicolegal cases of two districts of Delhi, namely South and Southeast besides hospital admission deaths. Out of the total 1713 autopsy cases viscera was preserved in 710 cases, which is an important finding which needs deliberations as it implies that the police investigation could not be concluded in 41.4% (Figure 1) of the Medicolegal cases for the want of viscera report. To understand the reason for such high number of viscera preservation, we will illustrate few examples of the type of cases in which the viscera is generally preserved [1-4]:

1. Suspected poisoning.
2. Sudden Natural Deaths with no hospital admission.

3. Accidental deaths with the suspicion of deceased/driver being intoxicated or under influence of alcohol/drugs.
4. Homicides to know about the toxicological/intoxication status of the victims to correlate the chain of events.
5. Equivocal cases of hanging to differentiate between suicidal and homicidal manner.
6. Suicides after intoxication
7. Suspected Deaths of females due to Dowry harassment.

So, we can deduce that determining the toxicological status of a deceased is essentially required in variety of cases even other than the poisoning cases. This is further supported by our finding that out of the total 323 viscera analysis report 41.5% reported the presence of a for a poison or drugs (Table 2). Ethyl alcohol alone and in combination with Methyl

Alcohol was detected in 78.3% of the total positive reports in different concentrations (Table 3). This again indicates that the significance of keeping Viscera as the presence of alcohol can hugely impact a Criminal Trial in a court of law in an accident case to fix the culpability. Presence of alcohol can also be linked as a confounding factor in suicidal cases, a deciding factor in Insurance cases and an important circumstantial evidence in Homicide cases.

The cutoff date for analyzing the viscera reports was fixed as 30th April 2017 which is about more than three years if calculated from the end of the study year 2013. The viscera report was not received in 54.5 % cases till cutoff date. It implies that in about 387 cases of Medicolegal death conducted in a year (Figure 2), the investigation was still pending even after three years have passed since autopsy was done. It is a matter of grave concern as the data collected is only for the two districts of the county in a single year. There were 640 districts in India as per the data of 2011 census [5]. If there are 387 cases pending in two districts of the National capital even after three years, one can very well imagine the number of incomplete investigations across all the districts of the country which may run into lakhs per year. The first and the foremost reason for the delay is insufficient number of Forensic Science Laboratories (FSLs) in the country. There are only 7 FSLs under Central Government and about 31 FSLs in different states of the country [6,7] while Medicolegal postmortem are conducted at all major District Hospitals and Government Medical College. So a gross mismatch is clearly visible between the scientific demand and available infrastructure for analysis of viscera.

The viscera preserved routinely during autopsy for Toxological analysis consist of Stomach with contents sealed in one jar, parts of liver with gall bladder, kidneys, and spleen sealed in another jar, about 20-50 ml of blood in one container and a solution of preservative in another container. The preservative used in most of the cases is saturated solution of common salt [1-4]. The human tissue starts to degrade after death and the preservation of the viscera can only slow the process but does not completely stall it [1-4]. An Honorable High Court of Calcutta had queries regarding the procedure of preserving the Viscera and its analysis for which an amicus curiae was appointed [8]. The amicus curiae consulted the experts who informed that viscera can be preserved only if properly refrigerated and will decompose in six months. Currently the viscera are collected by the police officers and stored in the police station at room temperature. They are

submitted in the FSLs as per the waiting list according to the priority of the case. Delay in processing of Viscera leading to decomposition of the tissues is a well established reason for a negative analysis [9-11]. In our study viscera analysis reports of only 6.2% of the total 710 cases were received within six months (Table 1), the ideal time in which the analysis should have been conducted. Further analysis of the viscera in the pending 387 cases after more than three years have passed seems nothing but a mere formality as the tissues would have been already decomposed and now will not be of any aid in Medicolegal investigation. Few previous studies [12-14] done specifically in poisoning cases have reported about the non detection of poison. Malik [15] also pointed about the pendency in the viscera reports. But no study specifically tried to understand the reasons and the solutions to address this issue. One more important finding which needs to be mentioned is that the quantification was done only in the cases where Ethyl alcohol and methyl alcohol were detected. Many poisons like Lead, Organophosphorus, Pesticides, Arsenic etc have been reported to be present in general population [16-20]. So in absence of the quantification attributing cause of death due to a specific poison is a questionable issue and importance of the viscera report is reduced to a mere corroborating evidence.

The above mentioned findings and discussion mandates the need of overhauling the current mechanism of viscera analysis and infrastructure. Indian is a developing Nation and is in a continuous process of improvisation. By this study we intend to highlight the drawbacks in the system not to criticize but only to improve the process of delivery of Natural justice.

Recommendations

1. There is a clear and urgent requirement of establishing more Laboratories for Toxological analysis in India at both State and National Level to cope up with the increasing work load so as to ensure accurate analysis of viscera and timely conclusion of Medicolegal Death Investigation.
2. A toxicology unit which can handle the analysis of the commonly found poisons and drugs should be established associated with Government Medical Colleges and District Hospitals where the postmortem are being conducted.
3. The laboratories should take measures to quantify the poison/drug detected in the Viscera so as to increase the positive evidentiary value of the analysis.

Compliance with Ethical Standards

Funding

There was no funding involved with the study.

Conflict of Interest

There is no conflict of interests of any of the author.

Ethical approval

The ethical approval was taken from Institutional ethics Committee.

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Community and Public Health Nursing	Triannual	5500	5000	430	391
Dermatology International	Semiannual	5500	5000	430	391
Gastroenterology International	Semiannual	6000	5500	469	430
Indian Journal of Agriculture Business	Semiannual	5500	5000	413	375
Indian Journal of Anatomy	Bi-monthly	8500	8000	664	625
Indian Journal of Ancient Medicine and Yoga	Quarterly	8000	7500	625	586
Indian Journal of Anesthesia and Analgesia	Monthly	7500	7000	586	547
Indian Journal of Biology	Semiannual	5500	5000	430	391
Indian Journal of Cancer Education and Research	Semiannual	9000	8500	703	664
Indian Journal of Communicable Diseases	Semiannual	8500	8000	664	625
Indian Journal of Dental Education	Quarterly	5500	5000	430	391
Indian Journal of Emergency Medicine	Quarterly	12500	12000	977	938
Indian Journal of Forensic Medicine and Pathology	Quarterly	16000	15500	1250	1211
Indian Journal of Forensic Odontology	Semiannual	5500	5000	430	391
Indian Journal of Genetics and Molecular Research	Semiannual	7000	6500	547	508
Indian Journal of Hospital Administration	Semiannual	7000	6500	547	508
Indian Journal of Hospital Infection	Semiannual	12500	12000	938	901
Indian Journal of Law and Human Behavior	Semiannual	6000	5500	469	430
Indian Journal of Legal Medicine	Semiannual				
Indian Journal of Library and Information Science	Triannual	9500	9000	742	703
Indian Journal of Maternal-Fetal & Neonatal Medicine	Semiannual	9500	9000	742	703
Indian Journal of Medical & Health Sciences	Semiannual	7000	6500	547	508
Indian Journal of Obstetrics and Gynecology	Bi-monthly	9500	9000	742	703
Indian Journal of Pathology: Research and Practice	Monthly	12000	11500	938	898
Indian Journal of Plant and Soil	Semiannual	65500	65000	5117	5078
Indian Journal of Preventive Medicine	Semiannual	7000	6500	547	508
Indian Journal of Research in Anthropology	Semiannual	12500	12000	977	938
Indian Journal of Surgical Nursing	Triannual	5500	5000	430	391
Indian Journal of Trauma & Emergency Pediatrics	Quarterly	9500	9000	742	703
Indian Journal of Waste Management	Semiannual	9500	8500	742	664
International Journal of Food, Nutrition & Dietetics	Triannual	5500	5000	430	391
International Journal of Neurology and Neurosurgery	Quarterly	10500	10000	820	781
International Journal of Pediatric Nursing	Triannual	5500	5000	430	391
International Journal of Political Science	Semiannual	6000	5500	450	413
International Journal of Practical Nursing	Triannual	5500	5000	430	391
International Physiology	Triannual	7500	7000	586	547
Journal of Animal Feed Science and Technology	Semiannual	78500	78000	6133	6094
Journal of Cardiovascular Medicine and Surgery	Quarterly	10000	9500	781	742
Journal of Forensic Chemistry and Toxicology	Semiannual	9500	9000	742	703
Journal of Geriatric Nursing	Semiannual	5500	5000	430	391
Journal of Global Public Health	Semiannual				
Journal of Microbiology and Related Research	Semiannual	8500	8000	664	625
Journal of Nurse Midwifery and Maternal Health	Triannual	5500	5000	430	391
Journal of Organ Transplantation	Semiannual	26400	25900	2063	2023
Journal of Orthopaedic Education	Triannual	5500	5000	430	391
Journal of Pharmaceutical and Medicinal Chemistry	Semiannual	16500	16000	1289	1250
Journal of Practical Biochemistry and Biophysics	Semiannual	7000	6500	547	508
Journal of Psychiatric Nursing	Triannual	5500	5000	430	391
Journal of Social Welfare and Management	Triannual	7500	7000	586	547
New Indian Journal of Surgery	Bi-monthly	8000	7500	625	586
Ophthalmology and Allied Sciences	Triannual	6000	5500	469	430
Otolaryngology International	Semiannual	5500	5000	430	391
Pediatric Education and Research	Triannual	7500	7000	586	547
Physiotherapy and Occupational Therapy Journal	Quarterly	9000	8500	703	664
RFP Indian Journal of Medical Psychiatry	Semiannual	8000	7500	625	586
Urology, Nephrology and Andrology International	Semiannual	7500	7000	586	547

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