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Original Research Article

Gross Mucosal Features Of Stomach And Type Of Poison: An Autopsy Study

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Abstract

The study is designed to know the colour and state of stomach mucosa in all the poisoning death cases where an autopsy was conducted. The state of stomach mucosa in various poisons differs, probably due to preservatives, constituents or the poison by itself. But these changes remain static for a given poison irrespective of age, sex, stomach wash fluids, or the treatment adopted. Total 62 cases of death due to poisoning were studied at District Hospital Vijaypur from April 2019 to July 2021. Photographs of stomach mucosa were taken, viscera preserved and sent to RFSL through the police concerned. After receiving a chemical analysis report from the police, an opinion as to the cause of death chemical nature of poison is evident. It was compared with photographs of similar poisons. It was observed that the colour& state of mucosa was similar for specific poison subjected to variation in depth of colour, and there is a difference in colour and state of mucosa from one poison to another.

Keywords : Stomach mucosa, Gross appearance, RFSL report

Introduction

Despite science & technology development today, diagnosis of poison in living and dead is still misery, at least in developing countries like India. In a poisoning case, clinical diagnosis of poison is possible by their clinical signs or symptoms to the extent of class or group of poison, rather than individual poison by its chemical nature. Though clinical signs and some lab methods help diagnose the poison, exact identification of poison and administration of its specific anti-dote remains a challenge. In a regular autopsy service, in a case of suspected poisoning or death due to poisoning, autopsy surgeons examine stomach contents as to their quantity, colour, consistency, and odour, which may give some idea as to the class or group of poison. However, though the colour of the stomach mucosa is examined routinely, much emphasis is not given to it. Stomach mucosa is usually merely mentioned as congested or hemorrhagic. Beyond this, we often depend on chemical analysis by Forensic Science laboratories. There are very few studies in this regard.[1-5] The reported findings were- internal organs of the dead body were congested, and the stomach contents smelt strongly of almonds, or the stomach mucosa was noted to be blue, with heavy staining of the fundus and body, with sparing of the antrum. [1-5]

The colour and state of stomach mucosa in various poisoning cases are different for different poisons. The present study compares findings related to stomach mucosa with the exact chemical nature of poison determined by chemical analysis. During the autopsy, proper photographs of stomach contents and stomach wall were taken and compared with the chemical nature of the poison (determined by the chemical analyser's report). This will help arrive at a poisoning diagnosis if the chemical analysis report is negative for any poison in a given case. Likewise, this may be the only tool to decide the chemical nature of poison if the viscera is lost during transit or not fit for chemical analysis due

to various other reasons. Hence this study is undertaken to add to the literature on diagnostic tools in cases of death due to poisoning.

Methodology

The study was undertaken at District Hospital, Vijaypur, from March 2019 to July 2021, by Forensic Medicine Department. All the cases subjected to autopsy after receipt of the police requisition were considered for the study. All the fatal cases with a history of consumption of poison or the fatal cases where there was suspicion of poisoning were included in the study. While the fatal poisoning cases which were not subjected to chemical analysis or those cases wherein chemical analysis report is negative for any poison were excluded from the study. A total of 61 cases were studied from April 2019 to July 2021. Convenient random selection was done. For every case, detailed treatment history before death, autopsy findings, comorbidities, and wounds were noted as a routine. The stomach was dissected as per standard autopsy protocol; the contents were noted for their size/quantity, colour, consistency, and odour in all cases. Stomach mucosal wall colour was examined, clear photo of the contents and stomach wall was taken. Viscera was sent for chemical analysis through police. After receipt of the chemical analysis report, the nature of the poison detected by chemical analysis is known.

Results

A total of 734 autopsies were conducted during the study period. Among them, in 122 cases, viscera was preserved. In 65 cases, poison was detected. Its distribution is as shown in table 1. Out of 65 poison detected cases, 48(73.84 %) cases were of organophosphorus insecticide. Uniform bluish discolouration of stomach mucosa from dark blue to pale blue was observed in 35 (72.91 %) cases of organophosphorus compounds. In 5 cases (11.36%) out of 44 organophosphorus poisonings, there was uniform redness of stomach mucosa, while in 4 (9.09 %) cases had a hemorrhagic mucosal surface with redness. Erosion of rugae was noted in one case, while the dark congested mucosal surface was present in one case.

Discussion

Organophosphorus insecticides were the most common poison reported in an Indian study.[6] The findings in the present study are consistent with the findings of the above study. Other than organophosphorus compounds, poisons like carbamate or amitraz were also detected in the present study. Amitraz is used as an insecticide for controlling ectoparasites in animals. Commercial formulations of amitraz generally contain 12.5-20% of the drug in organic solvents.[7] Bookish description of mucosal discolouration is limited except for a few archaic descriptions without substantial evidence. For instance, copper sulfate is the most common cause of bluish discolouration of stomach content and mucosa at autopsy.[8] It is otherwise called blue vitriol or bluestone. It is found as large blue crystals; however, in this study, the colour of stomach mucosa rather than its contents was the objective. The colouring agent could be a natural food dye like butterfly pea (Clitoriaternatea) or an artificial colourant like Blue No. 1—Brilliant Blue FCF, E133 (blue shade) and Blue No. 2—Indigotine, E132 (indigo shade).[3]Nadjem et al.[9] observed bluish liquid with an aromatic smell in the oesophagus and stomach at autopsy in one case, which was found to be because of ingestion of liquid used in the windscreen washer system during winters. In their case, they noted that the deceased was a chronic alcoholic and consumed this liquid because it contained ethanol. This liquid had stained the mucosa of the gastrointestinal tract. Differential diagnosis of the blue gastric mucosa may also include post-mortem staining of the gastric mucosa with methylene blue.[10]In this study gross appearance of stomach mucosa observed during the autopsy is compared and analysed with the result of chemical analysis unlike all above-cited studies &the results are concluded as follows.

The present study concluded that the majority of cases were of organo-phosphorus compound poisoning. Stomach mucosa was uniform bluish congested. Only a few percentages of cases of organo-phosphorus compound poisoning have localized hemorrhagic red mucosa. In one case of Quinol Phos poison, stomach mucosa showed a uniform black tar-like

coating with congestion. In the case of Carbafuran poisonings stomach was of uniform red congested. In one case of Pyrethroid poisoning, stomach mucosa was showing pale red colour. However, in an Indian study, it is also reported that poison remained undetected in 33 % of deaths due to poisoning.[6] Hence, it is important that an alternate method should be employed to diagnose poisoning cases and corroborate it with clinical findings, in absence of detection of the compound in chemical analysis. It is evident from the present study results that, examining stomach mucosa in case of poisoning fatalities is of vital importance, as it may give clues regarding the type of poison consumed. More studies with larger sample sizes and other variety of poisons are required to validate the study results.

Conflicts of interest/Competing interests: None

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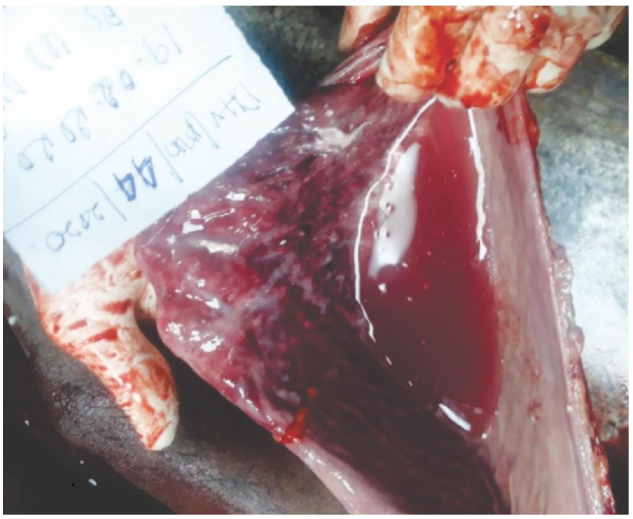
Table-1. Distribution of cases as per FSL report.

Poison		No of cases	%
Insecticides	Organophosphates	43	66.1
	Monocrotophos	2	3.07
	Quinolphos	1	1.54
	Chlorpyriphos	1	1.54
	Prophenophos	1	1.54
	Pyrethrides	4	6.15
Carbamates		4	6.15
Insecticide & Acaricide-mitraz		1	1.54
Phosphide ions		2	3.07
Herbicide	Glyphosate	2	3.07
	Di-Ethyl Amine	1	1.54
Pesticide (Imida-clopid)		1	1.54
Alcohol		4	6.15
Total		65	100

Table-2. Distribution of cases as per features of the mucosal surface.

Chemical nature of the poison	Uniform bluish Congestion	Uniform red congestion	Hemorrhagic erosions with redness	Rugae Erosions	Dark congestion	Pale white
OP	35	5	4	1	1	2
Imido-cloprid	-	-	1	-	-	-
Chlorpyriphos	-	-	1	-	-	-
Carbamates	1	-	-	-	-	2
Amitraz	1	-	-	-	-	-
Carbafuran	-	-	2	-	-	-
Phosphide ions	-	-	-	2	-	-
Pyrethroids	2	-	2	-	-	-
Glyphosate	-	-	-	-	1	1
Quinol Phos	-	-	-	-	1	-
Alcohol	-	-	3	-	-	-
Dimethyl Amine	-	-	-	-	1	-

Figure 1a



Stomach in Organo-Phosphorus poisoning

Carbafuran

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