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Frequency and Types of Complications Following Caustic Substance Ingestion Among Adult Patients Admitted to Abu Ali Sina Balkhi Regional Hospital During 1404 Solar Hijri

Authors Details

Abdul Sami Naseri[1*]

Department of [Internal Medicine Department], Abu Ali Sina Balkhi Regional Hospital, Balkh, Afghanistan.

Corresponding Author: *Abdul Sami Naseri*

ABSTRACT

Background: Caustic substance ingestion is an important gastrointestinal emergency that may cause acute and delayed injury to the upper gastrointestinal tract. The severity of injury depends on several factors, including the nature of the substance, concentration, amount ingested, and duration of tissue exposure. Complications may include gastrointestinal bleeding, perforation, esophageal stricture, gastric outlet obstruction, and death. Local data regarding the clinical characteristics and complications of caustic ingestion in Afghanistan remain limited.

Objective: To determine the frequency and types of complications following caustic substance ingestion among adult patients admitted to the Department of Internal Medicine of Abu Ali Sina Balkhi Regional Hospital during 1404 Solar Hijri.

Methods: A descriptive retrospective case-series study was conducted among adult patients admitted with caustic substance ingestion during 1404 Solar Hijri.All eligible patients whose medical records contained the required information were included using total/consecutive sampling. Data were collected regarding age, sex, type of caustic substance, intent of ingestion, time to hospital presentation, length of hospital stay, upper

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gastrointestinal bleeding, esophageal stricture, pyloric stricture, esophageal or gastric perforation, and treatment outcome. Data were analyzed using descriptive statistics and are presented as frequencies, percentages, means, and standard deviations.

Results: A total of 84 adult patients were included. The mean age was 25.92 ± 11.91 years, with a median age of 22 years. Sixty-three patients (75.0%) were female and 21 (25.0%) were male. The majority of patients were 18–29 years old (69; 82.1%). All recorded ingestions were intentional. Acidic substances were ingested by 66 patients (78.6%), while alkaline substances were involved in 18 (21.4%). The mean time from ingestion to hospital presentation was 2.22 ± 1.00 hours, and the mean hospital stay was 3.07 ± 1.90 days.

Upper gastrointestinal bleeding, documented as hematemesis at presentation, occurred in 20 patients (23.8%). Esophageal stricture three weeks after ingestion was documented in 3 patients (3.6%), while pyloric stricture was documented in 2 patients (2.4%). Esophageal or gastric perforation occurred in 2 patients (2.4%). Three patients (3.6%) died. Four patients (4.8%) were referred to an appropriately equipped health facility after developing complications during the three-week follow-up period. Seventy-seven patients (91.7%) were documented as recovered.

Conclusion: In this hospital-based series of adult caustic ingestion, patients were predominantly young adults and female, and all recorded ingestions were intentional. Acidic substances were more frequently involved than alkaline substances. Upper gastrointestinal bleeding was the most frequently documented complication, while esophageal stricture, pyloric stricture, perforation, and mortality occurred less frequently. The findings emphasize the importance of early presentation, close observation, and follow-up for delayed gastrointestinal complications.

1. Introduction

Caustic substance ingestion is a potentially life-threatening gastrointestinal emergency resulting from exposure of the upper gastrointestinal tract to corrosive substances, principally acids and alkalis. The clinical spectrum ranges from minor mucosal injury to deep tissue necrosis, perforation, hemorrhage, and death. Delayed complications may include esophageal strictures and gastric outlet obstruction.

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The extent of gastrointestinal injury depends on several factors, including the chemical characteristics of the ingested substance, concentration, amount ingested, and duration of contact with the gastrointestinal mucosa. Severe injuries may progress to perforation and systemic complications, whereas survivors of significant mucosal injury may subsequently develop strictures requiring prolonged treatment and nutritional support. [4-6]

The epidemiology of caustic ingestion varies considerably between populations. In a 10-year retrospective study from Loghman Hakim Hospital in Tehran, Iran, Alipour Faz et al. evaluated 348 patients and reported a mean age of 37.76 ± 17.62 years; 55.6% were male and 59.2% of ingestions were intentional. Mortality was 8%, while 15.2% required ICU admission and 33% underwent surgery. The investigators reported that intentional ingestion, greater volume, and more severe mucosal injury were associated with adverse outcomes. [1]

Similarly, a study conducted at Lady Reading Hospital, Peshawar, Pakistan, evaluated 145 patients with corrosive ingestion. The investigators reported that 66.89% were male, 71.72% had ingested alkaline substances, and 39.31% developed esophageal or gastric strictures. [2]

In contrast, a retrospective medicolegal study from New Delhi, India, examined 64 fatal cases of corrosive ingestion. Males represented 64.06% of cases, sulfuric acid was the most commonly identified substance, and perforation with peritonitis was the leading reported cause of death. Most cases were intentional. [3]

Despite the clinical importance of caustic ingestion, there is limited published information describing its complications among adults in northern Afghanistan. Therefore, the present study was conducted to determine the frequency and types of complications among adult patients admitted to Abu Ali Sina Balkhi Regional Hospital during 1404 Solar Hijri..

2. Objective

General Objective

To determine the frequency and types of complications following caustic substance ingestion among adult patients admitted to Abu Ali Sina Balkhi Regional Hospital during 1404 Solar Hijri..

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Specific Objectives

1. To determine the frequency of esophageal stricture following caustic substance ingestion.
2. To determine the frequency of upper gastrointestinal bleeding.
3. To determine the frequency of esophageal or gastric perforation.
4. To determine the frequency of pyloric stricture.
5. To determine mortality among patients with caustic substance ingestion.
6. To describe the age and sex distribution of affected patients.
7. To determine the frequency of acidic and alkaline caustic substances.
8. To describe the intention of ingestion.
9. To determine the time from ingestion to hospital presentation.
10. To determine the duration of hospital stay and treatment outcome.

3. Materials and Methods

3.1 Study Design

A **descriptive retrospective case-series study** was conducted.

3.2 Study Setting

The study was conducted in the Department of Internal Medicine, Abu Ali Sina Balkhi Regional Hospital, Balkh, Afghanistan.

3.3 Study Period

The study covered the period from 1 Hamal 1404 to the end of Hoot 1404 Solar Hijri..

3.4 Study Population

The study population consisted of adult patients admitted to the Department of Internal Medicine with documented caustic substance ingestion during the study period.

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3.5 Sampling Method

Total/consecutive sampling was used. All eligible patient records available during the study period were included.

3.6 Sample Size

A total of **84 eligible patients** were included in the final analysis.

3.7 Inclusion Criteria

- Age ≥18 years.
- Documented caustic substance ingestion.
- Admission to the Department of Internal Medicine.
- Availability of the required clinical information in the medical record.

3.8 Exclusion Criteria

- Age <18 years.
- Unconfirmed caustic substance ingestion.
- Records without sufficient information for the variables included in the study.

3.9 Study Variables

The variables included:

- Age
- Sex
- Type of caustic substance
- Intent of ingestion
- Time to hospital presentation
- Length of hospital stay
- Hematemesis/upper gastrointestinal bleeding

DOI: *10.5281/zenodo.23910191*

- Esophageal stricture at three weeks
- Pyloric stricture at three weeks
- Esophageal or gastric perforation during hospitalization
- Treatment outcome

3.10 Data Collection

Data were extracted retrospectively from patient medical records using a structured data collection form corresponding to the variables specified in the research proposal.

3.11 Data Analysis

Data were coded and analyzed descriptively using MS Excel program. Continuous variables were summarized using mean, standard deviation, median, minimum, and maximum where appropriate. Categorical variables were presented as frequencies and percentages.

3.12 Ethical Considerations

Patient confidentiality was maintained throughout the study. No patient names or personal identifiers were included in the research dataset. The data were used exclusively for scientific purposes, and institutional approval was to be obtained according to the hospital's research protocols.

4. Results

4.1 Demographic Characteristics

A total of 84 patients were included.

The mean age was 25.92 ± 11.91 years, with ages ranging from 18 to 89 years. The median age was 22 years.

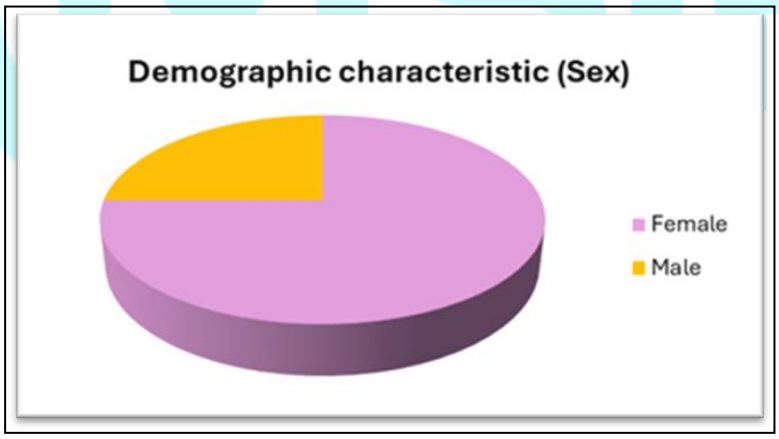
The majority of patients were young adults. Sixty-nine patients (82.1%) were aged 18–29 years, 8 (9.5%) were 30–39 years, 2 (2.4%) were 40–49 years, and 5 (6.0%) were ≥50 years.

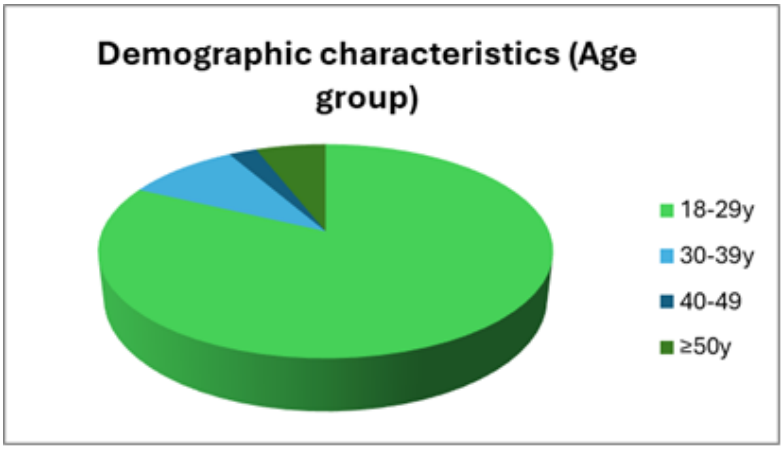
Females comprised 63 patients (75.0%) and males 21 (25.0%).

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Table 1. Demographic characteristics of patients

Characteristic	n	%
Total	**84**	**100**
Sex		
Female	63	75.0
Male	21	25.0
Age group (years)		
18–29	69	82.1
30–39	8	9.5
40–49	2	2.4
≥50	5	6.0
Age		
Mean ± SD	25.92 ± 11.91	—
Median	22	—
Range	18–89	—





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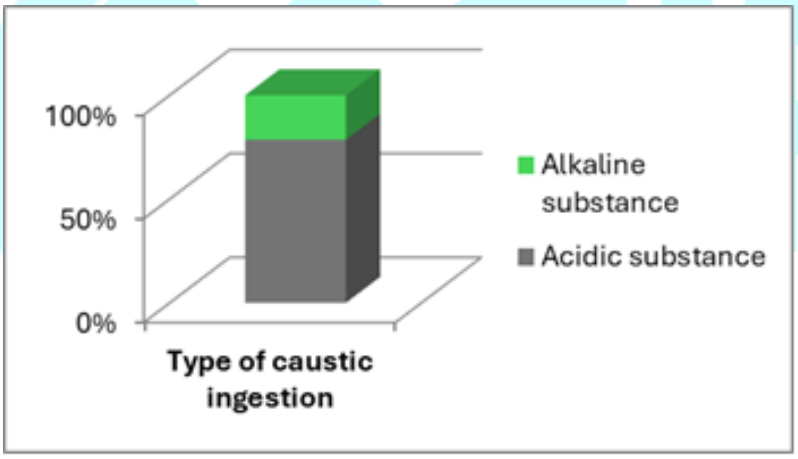
4.2 Type and Intent of Caustic Ingestion

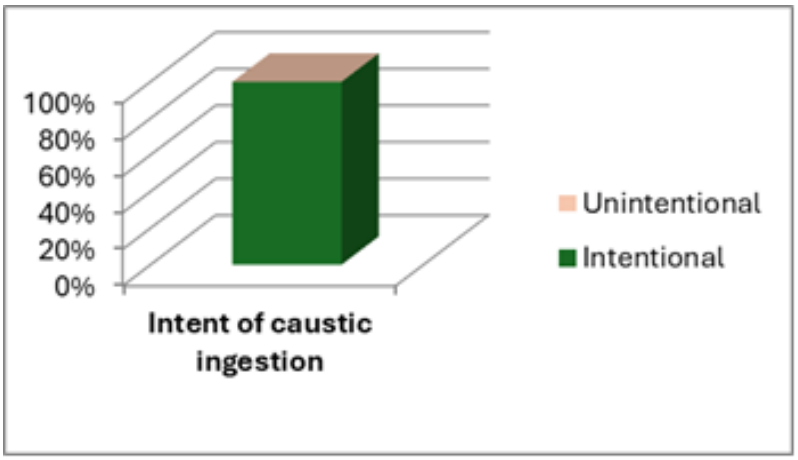
Acidic substances were the most frequently recorded caustic agents, accounting for 66 cases (78.6%), while alkaline substances accounted for 18 cases (21.4%).

Importantly, all 84 cases (100%) were recorded as intentional ingestion. No accidental ingestion was recorded in this dataset.

Table 2. Type and intent of caustic ingestion

Variable	n	%
Acidic substance	66	78.6
Alkaline substance	18	21.4
Intentional ingestion	84	100
Unintentional ingestion	0	0





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4.3 Time to Hospital Presentation and Length of Stay

The mean time from ingestion to hospital presentation was **2.22 ± 1.00 hours**, with a range of 1–5 hours and a median of 2 hours.

The mean duration of hospital stay was **3.07 ± 1.90 days**, with a range of 1–12 days and a median of 3 days.

Table 3. Time to presentation and hospital stay

Variable	Mean ± SD	Median	Range
Time to hospital presentation (hours)	2.22 ± 1.00	2	1–5
Length of hospital stay (days)	3.07 ± 1.90	3	1–12

5. Frequency of Complications

Upper gastrointestinal bleeding was the most frequently documented complication. Hematemesis at presentation was recorded in 20 patients (23.8%).

Esophageal stricture three weeks after ingestion occurred in 3 patients (3.6%), while pyloric stricture was identified in 2 patients (2.4%).

Esophageal or gastric perforation during hospitalization occurred in 2 patients (2.4%).

Three patients died, giving an overall mortality of 3.6%.

Table 4. Frequency of complications and outcomes

Complication/outcome	n	%
Upper GI bleeding/hematemesis	20	23.8
Esophageal stricture at 3 weeks	3	3.6
Pyloric stricture at 3 weeks	2	2.4
Esophageal/gastric perforation	2	2.4
Death	3	3.6
Referral after delayed complications	4	4.8
Recovered	77	91.7

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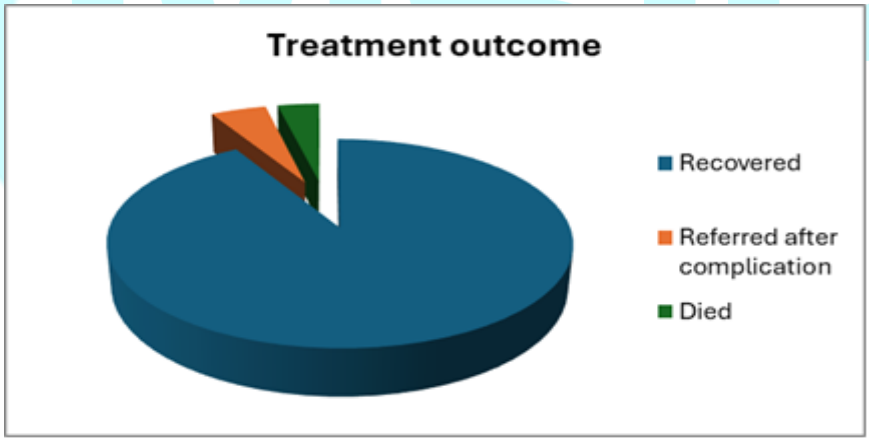
Important observation: the complication categories were not mutually exclusive. For example, some patients with strictures also had hematemesis, and therefore the percentages in Table 4 should not be added together to calculate an overall complication rate.

6. Treatment Outcome

Among the 84 patients, 77 (91.7%) recovered, 3 (3.6%) died, and 4 (4.8%) were referred to a more appropriately equipped health facility after developing complications during the subsequent three-week period.

Table 5. Treatment outcome

Treatment outcome	n	%
Recovered	77	91.7
Referred after complications	4	4.8
Died	3	3.6
Total	**84**	**100**



7. Distribution of Complications According to Caustic Type

Among the 66 patients who ingested acidic substances, 15 (22.7%) had hematemesis. Among the 18 patients who ingested alkaline substances, 5 (27.8%) had hematemesis.

Esophageal stricture was recorded in 3 patients, all following acid ingestion. Pyloric stricture occurred in two patients, one after acid ingestion and one after alkali ingestion. Both documented perforations and all three deaths occurred among patients who had ingested acidic substances.

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Because the number of events was small, these observations should be interpreted descriptively rather than as evidence of a statistically established difference between acids and alkalis.

8. Discussion

The present study evaluated 84 adult patients admitted with caustic substance ingestion during 1404 solar hijri. The principal findings were the predominance of young adults, female sex, intentional ingestion, and acidic substances. Upper gastrointestinal bleeding was the most frequently documented complication, while esophageal stricture, pyloric stricture, perforation, and mortality were less frequent.

The mean patient age in the current study was 25.92 years, substantially younger than the mean age of 37.76 years reported by Alipour Faz et al. in their Iranian study of 348 patients. [1] The difference may reflect variations in population structure, referral patterns, social circumstances, and study setting.

A marked female predominance was observed in the present study, with females representing 75% of patients. This differs from both the Iranian study, in which males represented 55.6%, and the Pakistani study, in which 66.89% of patients were male. [1,2] Such differences may reflect important regional and population-specific patterns of caustic exposure and intentional ingestion.

All 84 patients in the present dataset were documented as having intentionally ingested the caustic substance. This proportion is considerably higher than the 59.2% intentional ingestion reported in the Iranian series. [1] It is also higher than the proportion reported in the fatal Indian autopsy series, where 87.5% of cases were considered intentional. [3] However, direct comparison should be made cautiously because the Indian study included only fatal cases, whereas the current study included hospitalized survivors as well as fatal cases.

Acidic substances accounted for 78.6% of the present cases. This finding contrasts with the Pakistani study, where alkaline substances constituted 71.72% of cases. [2] The difference may reflect differences in the availability and household use of corrosive products between the two settings.

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Upper gastrointestinal bleeding was documented in 23.8% of the present patients. The bleeding was recorded as hematemesis at presentation. Because this variable was based on the clinical record and not on a standardized endoscopic grading system, the finding should be interpreted as documented presenting hematemesis, rather than as a measure of the anatomical severity of mucosal injury.

Esophageal stricture occurred in 3.6% of patients and pyloric stricture in 2.4%. These proportions are lower than the 39.31% overall esophageal or gastric stricture rate reported by Khan et al. in Peshawar. [2] An important methodological difference is that the Pakistani study specifically investigated stricture formation in a gastroenterology population, whereas the current study was conducted in an internal medicine inpatient population. In addition, follow-up information in the current dataset was limited to the recorded three-week period, which may underestimate later stricture formation.

Perforation occurred in 2.4% of patients in the present study. Both perforations occurred among patients who had ingested acidic substances. In the fatal Delhi series, perforation with peritonitis was reported as the leading cause of death, accounting for 46.88% of fatal cases. [3] The difference is expected in part because the Delhi study specifically examined fatal medicolegal cases, while the present study included all eligible hospitalized patients.

Mortality in the present series was 3.6%, lower than the 8% mortality reported by Alipour Faz et al. in Iran. [1] Again, the differences in patient characteristics, referral systems, severity of injury, and available treatment facilities should be considered when interpreting these findings.

The present study also demonstrated relatively early presentation, with a mean presentation time of approximately 2.2 hours. Early presentation may provide an opportunity for prompt assessment and management, although this study did not collect sufficient information on the exact treatment interventions, endoscopic grades, laboratory findings, or surgical procedures to establish their relationship with outcomes.

9. Limitations

1. The study depended on the completeness and accuracy of existing medical records.
2. Endoscopic injury grades were not available in the provided dataset.

 DOI: *10.5281/zenodo.23910191*

3. The dataset did not contain detailed information regarding laboratory abnormalities, imaging, ICU admission, surgery, or specific medical treatment.

10. Conclusion

This retrospective case series of 84 adult patients with caustic substance ingestion at Abu Ali Sina Balkhi Regional Hospital during 1404 Solar Hijri demonstrated a predominance of young adults, females, intentional ingestion, and acidic substances.

The most frequently documented complication was upper gastrointestinal bleeding, occurring in approximately one-quarter of patients. Esophageal stricture, pyloric stricture, and gastrointestinal perforation were less frequent but clinically important complications. Overall mortality was 3.6%, while 91.7% of patients were documented as recovered.

The findings provide preliminary hospital-based data on caustic ingestion in northern Afghanistan and may serve as a baseline for future multicenter studies with larger samples and more detailed clinical, endoscopic, and follow-up information.

11. Recommendations

1. Standardized documentation of the exact chemical agent, concentration, estimated amount ingested, and circumstances of ingestion should be encouraged.
2. Endoscopic findings and injury grades should be systematically documented when clinically indicated.
3. Future studies should include muldisceplinary approaches (including general surgery for managemnt of complications and psyciatric study for psychologic factors related to intentional cases).
4. Preventive education and safe storage of corrosive household and industrial substances should be considered, particularly given that all cases in this dataset were documented as intentional.

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