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Original Article

Corrosive-induced gastric outlet obstruction in children: a retrospective observational study from a tertiary care center in Bihar, India.

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ABSTRACT

Background:

Corrosive ingestion remains an important cause of gastrointestinal injury in children, particularly in developing countries. Gastric outlet obstruction (GOO) is a serious delayed complication resulting from fibrosis and stricture formation following corrosive injury.

Objective:

To evaluate the clinical profile, management strategies, and outcomes of children with corrosive-induced gastric outlet obstruction.

Methods:

A retrospective observational study was conducted in the Department of Pediatric Surgery, Government Medical College & Hospital, Purnea, Bihar, India, between January and August 2025. Medical records of 100 children diagnosed with corrosive-induced GOO were reviewed. Demographic characteristics, type of corrosive agent, clinical presentation, endoscopic findings, treatment modalities, and outcomes were analyzed. Chi-square test was used to assess the association between corrosive type and severity of obstruction.

Results:

Among 100 children, 62.0% were aged 3–6 years. Acid ingestion accounted for 68.0% of cases, while alkali ingestion accounted for 32.0%. Vomiting (92.0%) and weight loss (74.0%) were the most common presenting symptoms. Endoscopy revealed pyloric stricture in 81.0% of patients. Surgical management was required in 56.0% of cases, whereas 44.0% were managed conservatively. A significant association was observed between acid ingestion and severe gastric outlet obstruction ($\chi^2=6.45$, $p=0.011$). Clinical improvement occurred in 78.0% of patients, while complications and mortality were observed in 14.0% and 8.0%, respectively.

Conclusion:

Corrosive-induced gastric outlet obstruction remains a significant cause of morbidity in children. Early diagnosis and individualized management improve clinical outcomes.

Recommendation:

Community awareness regarding safe storage of corrosive substances and prompt medical evaluation following ingestion should be strengthened to reduce preventable complications.

Keywords: Corrosive ingestion, Gastric outlet obstruction, Pediatric, Acid injury, Alkali injury

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BACKGROUND OF THE STUDY

Corrosive ingestion in children is a preventable yet persistent clinical problem, particularly in low- and

middle-income countries. Accidental ingestion of household cleaning agents, acids, and alkalis often results in varying degrees of gastrointestinal injury



depending on the nature, quantity, and duration of exposure [1]. Gastric outlet obstruction (GOO) is a delayed but serious complication, primarily associated with acid ingestion due to coagulative necrosis leading to fibrosis and stricture formation [2,3].

Children are especially vulnerable due to exploratory behavior and a lack of awareness. Studies have shown that most incidents occur in children under the age of 5 years [4]. The stomach, particularly the antrum and pylorus, is commonly affected due to pooling of corrosive substances [5]. Acid ingestion tends to spare the esophagus but causes significant gastric injury, whereas alkali ingestion primarily affects the esophagus [6,7].

The pathophysiology involves acute inflammation followed by ulceration and eventual fibrosis, leading to luminal narrowing [8]. Clinical manifestations include persistent non-bilious vomiting, early satiety, weight loss, and dehydration [9]. Diagnosis is based on clinical suspicion, endoscopy, and imaging studies such as contrast-enhanced CT or barium studies [10].

Management strategies vary from conservative approaches, including nutritional support and endoscopic dilatation, to surgical interventions such as pyloroplasty or gastrojejunostomy [11–13]. Early intervention improves prognosis and reduces morbidity [14].

Despite advances in management, there remains limited data on pediatric populations from rural regions. This study aims to bridge that gap by evaluating clinical patterns and outcomes in a tertiary care setting in Bihar, India.

Therefore, the present study was conducted to evaluate the demographic characteristics, clinical presentation, endoscopic findings, management strategies, and treatment outcomes of children with corrosive-induced gastric outlet obstruction presenting to a tertiary care hospital in Bihar, India.

METHODOLOGY

Study Design

This retrospective observational study was conducted to evaluate the clinical profile, management, and outcomes of children diagnosed with corrosive-induced gastric outlet obstruction.

Study Setting

The study was conducted in the Department of Pediatric Surgery, Government Medical College & Hospital (GMCH), Purnea, Bihar, India. GMCH is a tertiary-care teaching hospital serving patients from Purnea district and neighboring districts of Bihar, as well as adjoining regions of West Bengal. The hospital provides specialized pediatric, surgical, medical, obstetric, emergency, and critical care services and receives referrals from primary and secondary healthcare facilities. The study covered the period from January 2025 to August 2025.

Variables

The study variables included:

- Age
- Gender
- Type of corrosive agent (acid/alkali)
- Time interval between ingestion and hospital presentation
- Clinical symptoms
- Endoscopic findings
- Treatment modality
- Clinical outcome

Corrosive-induced GOO was diagnosed based on persistent non-bilious vomiting together with radiological or endoscopic evidence of obstruction at the pyloric or antral region.

Data Sources and Measurements

Data were retrieved from medical records, admission registers, endoscopy reports, imaging records, operative notes, and discharge summaries. Clinical features were documented from patient records. Endoscopic findings were obtained from upper gastrointestinal endoscopy reports. Treatment modalities and outcomes were extracted from operative records and follow-up documentation.

Quantitative Variables

Age was categorized into four groups (1–2 years, 3–6 years, 7–10 years, and 11–14 years) to facilitate age-specific analysis. Frequencies and percentages were calculated for all categorical variables.



Statistical Analysis

Data were entered into Microsoft Excel and analyzed using SPSS version 25.0. Descriptive statistics were presented as frequencies and percentages. The association between the type of corrosive agent and the severity of obstruction was evaluated using the chi-square test. A p-value <0.05 was considered statistically significant.

Ethical Considerations

The study protocol was approved by the Institutional Ethics Committee of Government Medical College & Hospital, Pune. Patient confidentiality was

maintained throughout the study, and all collected information was anonymized before analysis.

RESULTS

A total of **100 pediatric patients** diagnosed with corrosive-induced gastric outlet obstruction (GOO) were included in the study.

1. Age Distribution

The majority of patients were in the **3–6 years age group (62%)**, followed by **1–2 years (18%)**, indicating higher vulnerability among younger children. Detailed distribution is shown in **Table 1**.

Table 1: Age-wise Distribution of Patients

Age Group (Years)	Number (n)	Percentage (%)
1–2	18	18%
3–6	62	62%
7–10	12	12%
11–14	8	8%

2. Type of Corrosive Agent

Acid ingestion was significantly more common (**68%**) compared to alkali (**32%**), as shown in **Table 2**. This distribution is also illustrated graphically in **Figure 1**.

Table 2: Type of Corrosive Agent Ingested

Type of Agent	Number (n)	Percentage (%)
Acid	68	68%
Alkali	32	32%

3. Clinical Presentation

The most common presenting symptom was **persistent non-bilious vomiting (92%)**, followed by **weight loss (74%)** and **abdominal pain (48%)**. Less common symptoms included dysphagia (**30%**). These findings are summarized in **Table 3**.

Table 3: Clinical Presentation of Patients

Clinical Feature	Frequency (n)	Percentage (%)
Vomiting	92	92%
Weight loss	74	74%
Abdominal pain	48	48%



Clinical Feature	Frequency (n)	Percentage (%)
Dysphagia	30	30%

4. Endoscopic Findings

Page | 4 Upper gastrointestinal endoscopy revealed that pyloric stricture was present in 81% of patients, while antral narrowing without complete obstruction was observed in 19% cases, as shown in Table 4.

Table 4: Endoscopic Findings

Finding	Number (n)	Percentage (%)
Pyloric stricture	81	81%
Antral narrowing	19	19%

5. Management Approach

Out of 100 patients, 56% required surgical intervention, whereas 44% were managed conservatively with nutritional support and endoscopic dilatation. Details are provided in Table 5 and illustrated in Figure 2.

Table 5: Treatment Modalities

Treatment Type	Number (n)	Percentage (%)
Conservative	44	44%
Surgical	56	56%

6. Outcome Analysis

Most patients showed clinical improvement (78%), while 14% developed complications such as recurrent strictures or infections. The mortality rate was 8%, as summarized in Table 6.

Table 6: Outcome of Patients

Outcome	Number (n)	Percentage (%)
Improved	78	78%
Complications	14	14%
Mortality	8	8%

7. Statistical Analysis

A Chi-square test was applied to assess the association between the type of corrosive agent and the severity of gastric outlet obstruction.

- χ^2 (Chi-square value) = 6.45
- p-value = 0.011

This indicates a statistically significant association ($p < 0.05$) between acid ingestion and severe gastric

outlet obstruction, as acids were more likely to result in pyloric strictures requiring surgical management.

Summary of Key Findings

The present study demonstrated that the highest incidence of corrosive-induced gastric outlet obstruction was observed in children aged 3–6 years. Acid ingestion was found to be the predominant cause compared to alkali ingestion. Clinically, vomiting emerged as the most common presenting symptom



among patients. Endoscopic evaluation revealed that pyloric stricture was the most frequent finding. In terms of management, more than half of the patients required surgical intervention, while the remaining were managed conservatively. Furthermore, statistical analysis indicated a significant association between acid ingestion and the severity of gastric outlet obstruction ($p = 0.011$).

DISCUSSION

The present study evaluated 100 children with corrosive-induced gastric outlet obstruction and demonstrated that children aged 3–6 years constituted the largest proportion of cases (62.0%). This finding supports previous reports indicating that preschool-aged children are at the highest risk because of their exploratory behavior and limited awareness of hazardous household substances. Similar age distributions have been reported by Kay and Wyllie and other investigators studying corrosive injuries in pediatric populations [14,15].

Acid ingestion was responsible for 68.0% of cases and showed a statistically significant association with severe gastric outlet obstruction ($\chi^2=6.45$, $p=0.011$). This observation is consistent with the known pathophysiology of acid injury, which commonly affects the gastric antrum and pylorus through coagulative necrosis, eventually resulting in fibrosis and stricture formation. Previous studies have similarly reported greater gastric involvement following acid ingestion compared with alkali exposure [16,17,18].

Vomiting was the most common presenting symptom, occurring in 92.0% of patients, followed by weight loss in 74.0%. These findings reflect progressive narrowing of the gastric outlet and impaired gastric emptying. Persistent vomiting contributes to nutritional deficiencies and dehydration, explaining the high prevalence of weight loss observed in affected children [19,20,21].

Endoscopic evaluation demonstrated pyloric stricture in 81.0% of patients, confirming that the pylorus is the principal site of injury in corrosive-induced gastric outlet obstruction. Similar findings have been documented in studies by Tekant et al. and other investigators [22,23].

More than half of the patients (56.0%) required surgical intervention, indicating that many children presented with advanced disease unsuitable for conservative treatment. Delayed referral, limited access to specialist care, and late recognition of symptoms may contribute to the increased need for surgery in resource-limited settings [24,25].

Although clinical improvement was achieved in 78.0% of patients, complications occurred in 14.0%, and mortality was observed in 8.0%. These findings emphasize the importance of early diagnosis, nutritional optimization, and timely intervention to improve outcomes.

Generalizability

Despite being conducted at a single center, the hospital serves a large referral population from multiple districts of Bihar and neighboring regions. Therefore, the findings may apply to similar tertiary-care institutions in resource-limited settings where accidental corrosive ingestion remains common.

CONCLUSION

Corrosive-induced gastric outlet obstruction in children is a serious but preventable condition. Early diagnosis, appropriate management, and public awareness are essential to reduce morbidity and mortality.

Limitations

This study has several limitations. First, its retrospective design relied on previously recorded hospital data, which may be subject to incomplete documentation and information bias. Second, the study was conducted at a single tertiary-care center, limiting generalizability to other populations. Third, long-term follow-up data were unavailable for some patients, preventing assessment of late complications and quality-of-life outcomes.

RECOMMENDATIONS

Based on the findings of the present study, several preventive and clinical measures are suggested. Increasing **public awareness** regarding the dangers of corrosive substances is essential to reduce accidental ingestion in children. Proper **safe storage of household**



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chemicals, particularly acids and alkalis, in childproof containers and out of reach of children should be strictly encouraged. Additionally, **early hospital referral** following suspected ingestion is crucial for timely diagnosis and management, which can significantly reduce complications such as gastric outlet obstruction.

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CONFLICT OF INTEREST

The authors declare no conflicts of interest related to this study.

Source of Funding

The study received no external funding. The funders had no role in study design, data collection, analysis, manuscript preparation, or publication decisions.

LIST OF ABBREVIATIONS

GOO – Gastric Outlet Obstruction
CT – Computed Tomography
SPSS – Statistical Package for the Social Sciences
IEC – Institutional Ethics Committee
GMCH – Government Medical College & Hospital

Data Availability Statement

The datasets used and analyzed during the current study are available from the corresponding author upon reasonable request.

Author Contributions

Shakeb Ahmad: Conceptualization, data collection, data analysis, manuscript drafting.

Erum Yasmin: Literature review, methodology development, statistical interpretation, manuscript review.

Prem Prakash: Study supervision, validation of findings, critical revision of manuscript, and final approval.

Author Biography

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