

## ORIGINAL ARTICLE

**Epidemiological Characteristics, Spectrum of Upper Gastrointestinal Tract Injuries and Burden of Corrosive Intake Patients in A Tertiary Care Hospital in Islamabad**Hyder Wajid Abbasi<sup>1</sup>, Warda Aftab<sup>1</sup>, Sara Shahid<sup>2</sup>, Mashood Ali<sup>1</sup>, Javeria Zahid<sup>3</sup>, Shumaila Naz<sup>4</sup>, Amna Ishtiaq<sup>4</sup>**ABSTRACT**

**Objective:** To investigate the epidemiology and spectrum of upper gastrointestinal (UGI) tract injuries, as well as to assess the burden of Corrosive intake patients who presented to an Islamabad tertiary care hospital.

**Study Design:** Descriptive cross-sectional.

**Place and Duration of Study:** The study was carried out at the Department of Gastroenterology of Pakistan Institute of Medical Sciences, Islamabad, Pakistan from January 2021 to December 2021.

**Materials and Methods:** A retrospective descriptive study was carried out at the department of Gastroenterology using patient records. After taking a thorough history, patients were admitted in the hospital, which was followed by a physical examination, necessary investigations, and an initial emergency management. The study did not include any follow-up cases. Corrosive ingestion induced tissue damage was assessed via endoscopy using Zargar's classification. The data was analyzed using SPSS version 26.

**Results:** The total number of patients who were brought to emergency department with corrosive ingestion during one year were 74. There were 45 females (60.81%) and 29 male patients (39.19%). Age ranged from 13 to 60 years (mean  $27.01 \pm 18.91$ ) with highest incidence in the age group of 21-30 years which was 44.59 % followed by 11-20 age Group (28.28 %). 41 patients were unmarried (55.41%), whereas 33 were married (44.59 %). Corrosive ingestion was most common in illiterate patients (44.59 %). 46 patients (62.16%) confessed that they ingested corrosive substance intentionally while 28 (37.84 %) claimed it happened due to accidental ingestion. Washroom cleaner was found to be the most commonly used corrosive Agent (90.54%). The most common sites that sustained corrosive injuries were the oropharynx and oesophagus, while the duodenum was found to be the least affected with normal endoscopic examination in the majority of the patients (51.35 %).

**Conclusion:** In developing countries, corrosive ingestion is a major public health concern, with a high proportion of suicidal ingestions. It is particularly common in suicidal young people with easy access to washroom cleaners. The seriousness of this problem emphasises the importance of pursuing multidisciplinary solutions. In addition, strict action and stringent legislation by governing bodies are required in developing countries to limit adults' unrestricted access to hazardous corrosive elements.

**Keywords:** *Esophagus, Gastrointestinal Diseases, Organic Chemicals, Upper Gastrointestinal Tract.*

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**Introduction**

Worldwide, corrosive ingestion (the unintentional or intentional) consumption of corrosive or caustic substances is a serious public health concern.<sup>1</sup> It is more prevalent in developing countries, but it can also be found in developed countries. Around 10,000 to 50,000 corrosive ingestion cases are reported from the United States and the United Kingdom annually.<sup>2-4</sup> In the early phases of corrosive ingestion, airway edema is common clinical symptom.<sup>5</sup> Corrosive ingestions may result in lifelong

esophageal stricture and an increase in the risk of malignancies and other disorders in the chronic stages, depending on the amount and type of corrosive agents used and the duration of exposure. Corrosive agents include acids, alkalis, organophosphates, and other toxic substances.<sup>6,7</sup> The oesophagus is severely harmed by corrosive agents. They can cause oesophageal perforation, stricture formation, oesophageal cancer, and even death in the long run. The combined rate of these numerous problems is predicted to be between 23.61 and 89.3%.<sup>8,9</sup>

The severity of corrosive injuries is mostly determined by the duration of exposure, as well as the nature, quantity, and concentration of the corrosive agent.<sup>10</sup> The majority of corrosive ingesting cases in children are unintentional, however, the majority of adult cases (70.5%) are self-harm.<sup>11</sup> The most common causes of corrosive ingestion are psychiatric illnesses and socioeconomic stress. Unfortunately, most developing countries still have a high risk of corrosive ingestion and most of the cases remain unreported.<sup>12</sup> The literature on the clinical, epidemiology and presentation of patients with corrosive intake is woefully lacking. Only 37 studies on corrosive ingestion in low and lower middle income countries were published in the previous 17 years, according to a World Health Organisation (WHO) survey. Only eight of the 37 papers focused on the epidemiology of caustic intake.<sup>13</sup>

The data from Pakistan do not take into account the type of exposure or its contributing factors to corrosive ingestion. While general paediatric poisoning has been the focus of prior research, the magnitude of unintentional and intentional corrosive ingestion and the related factors, such as educational attainment, marital status, gender, and age, remain unknown. The aim of the present study is to examine the clinical-epidemiological characteristics as well as the severity of injury in patients who ingested corrosive agents. The data for the patients were collected from the Department of Gastroenterology, Pakistan Institute of Medical Sciences, Pakistan, which is a tertiary care health facility in twin cities (Rawalpindi-Islamabad), Punjab, Pakistan.

## Materials and Methods

This descriptive cross-sectional study was carried out

at the Department of Gastroenterology of Pakistan Institute of Medical Sciences (PIMS), Islamabad, Pakistan. Patients presented in the emergency department with corrosive ingestion in the period of January 2021 to December 2021 were included in this study. Patients were admitted after initial emergency management and stabilization, after that endoscopy was performed. It's worth noting that the department also accepts referrals from many other hospitals in the surrounding area. The study included all instances with caustic ingestion as the primary diagnosis. Patients admitted to upper GI and thoracic surgery departments with acute corrosive ingestion met the inclusion criteria. Follow-up cases as well as cases involving the consumption of substances other than corrosives were omitted from the study. A full history and thorough physical examination were used to evaluate all of these instances. Patients in the acute phase were admitted to the intensive care unit, where an urgent upper GI endoscopy was performed in accordance with standard operating practice. ZARGAR's caustic injury categorization method was used to classify the post-corrosive tissue damage. (Table 1).

**Table 1: ZARGAR's grading classification**

Grade	Features
grade 0	no mucosal damage
grade I	edema and hyperemia
grade IIa	superficial ulceration, erosions, friability, blisters, exudates, hemorrhages, or whitish membranes
grade IIb	additional deep, discrete, or circumferential ulcerations
grade IIIa	small scattered areas of multiple ulcerations and areas of necrosis with brown-black or grayish discoloration
grade IIIb	extensive necrosis
grade IV	Perforation

This study was conducted over a period of 12 months. The following variables were examined during this study: patient age, gender, area, marital status, education, the intention of using corrosive agents, and types of corrosive agents. For further examination, a variety of laboratory tests and imaging procedures (e.g., radiography, contrast studies, computed tomography (CT) scanning, and upper GI endoscopy) were performed based on the patient's needs.

Excel (Microsoft, Redmond, WA, USA) was used to create a database and to determine basic

frequencies. To begin with, we analyzed the data and categorized the variables using descriptive statistics. The data was statistically analyzed using the software SPSS version 26.<sup>14</sup> Chi-square test was used to check the association of the variable 'intention of patients' with the variables gender, marital status, education, age of patients, and the corrosive agent used, respectively. The significance level was taken as 0.05 throughout the analysis.

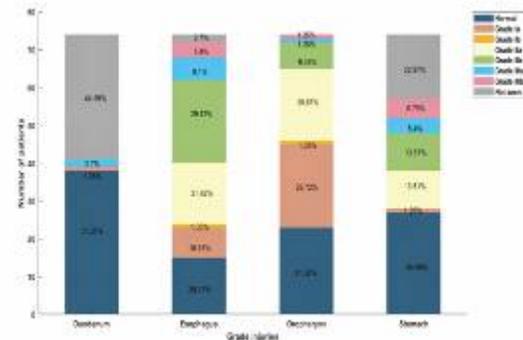
**Results**

This study was conducted by taking the cases registered in the hospital for one year as a sample, which consists of 74 patients in total. The patients were from Islamabad, Rawalpindi, and Murree, including 45 (60.8 %) females and 29 (39.1 %) males. 44.59% of the patients were married while 55.41% were unmarried. The incidence of corrosive ingestion was found higher in the age groups 11-20 and 21-30 (Table 2). Lack of education was one notable factor among these samples. It was found that the patients were having maximum education till 12<sup>th</sup> grade, among which 42 people were completely illiterate and never went to school. In total, there were 43 patients having primary, less, or no education while 31 had education from primary to 12<sup>th</sup> level. 62.16 % of the patients ingested corrosive substances intentionally and 37.84% of patients did that accidentally. It was also observed

that the corrosive ingestion cases were more frequent in females than the males. The most commonly used corrosive agent both for intentional or accidental cases was washroom cleaner which is obvious due to the ease of accessibility (Table 2).

Oropharynx and Oesophagus were observed to be the most affected parts of the body with the most frequent Grade Ia injuries (30.56%) and Grade IIb injuries (29.73%), respectively. Duodenum was found to be the least influenced body part as a result of corrosive intakes. (Figure 1 and Table 3).

The association of the variable 'intention of patients' was checked with different variables, including: gender, marital status, education, age of patients, and the corrosive agent used. Chi-square test was used to check the association between the variables. No significant association was found between the said variables except the association between the



**Fig 1: Percentage of grade injury levels in the affected body parts due to corrosive intakes**

intention of patients and the corrosive agent used with a *p*-value of 0.04. (Table 4).

The association of the corrosive intake was also checked with the grade injuries that occurred in the different body parts. A significant association was found between the corrosive intake and the grade injuries that occurred in the oropharynx and in the oesophagus, while no significant relationship has been seen between the corrosive intake and the grade injuries in the stomach and the duodenum. (Table 5).

**Discussion**

Corrosive ingestion is usually done with the intention of killing oneself, and it is associated with a potentially lethal presentation as well as long-term complications. It leads to high rates of illness, mortality, and lengthened hospitalization, putting a

**Table 2: Socio-demographic characteristic of patients (Mean Age = 27.01 ± 18.91)**

Variables	Characteristics	Participants	Frequency Percentage
<b>Age (classes)</b>	11-20	21	28.38%
	21-30	33	44.59%
	31-40	13	17.57%
	41-50	6	8.11%
	51-60	1	1.35%
<b>Gender</b>	Female	45	60.81%
	Male	29	39.19%
	Islamabad	24	32.43%
	Murree	6	8.11%
<b>Marital Status</b>	Rawalpindi	44	59.46%
	Married	33	44.59%
	Unmarried	41	55.41%
	<b>Education</b>	Uneducated	42
Primary		1	1.35%
Secondary		31	41.89%
<b>Intention</b>	Accidentally	28	37.84%
	Intentional	46	62.16%
<b>Corrosive agent</b>	Bleach	5	6.94%
	Washroom cleaner (acidic in nature)/ Corrosive intake	58	80.55%
	Caustic ingestion (drain cleaner/toilet bowlcleaner/detergents/metal polish)	9	12.50%

**Table 3: Grade injuries of patients**

Grade of injury	Frequencies	Percentage
<b>Oropharynx (n = 72)</b>		
Normal	21	29.17%
Grade Ia	22	30.56%
Grade Ib	1	1.39%
Grade IIa	19	26.39%
Grade IIb	7	9.72%
Grade IIIa	1	1.39%
Grade IIIb	1	1.39%
<b>Esophagus (n= 74)</b>		
Normal	15	20.27%
Grade Ia	8	10.81%
Grade Ib	1	1.35%
Grade IIa	16	21.62%
Grade IIb	22	29.73%
Grade IIIa	6	8.11%
Grade IIIb	4	5.41%
Not seen	2	2.70%
<b>Stomach (n= 74)</b>		
Normal	27	36.49%
Grade Ia	1	1.35%
Grade IIa	10	13.51%
Grade IIb	10	13.51%
Grade IIIa	4	5.41%
Grade IIIb	5	6.76%
Not seen	17	22.97%
<b>Duodenum (n= 74)</b>		
Normal	38	51.35%
Grade Ia	1	1.35%
Grade IIIa	2	2.70%
Not seen	33	44.59%

**Table 4: Association of the intention of patients with their gender, marital status, education and age**

Variables	Accidental	Intentional	Test statistics (p-value)
<b>Gender</b>			
Female	21	24	3.805 (0.051)
Male	7	22	
<b>Marital Status</b>			
Unmarried	14	27	0.533 (0.465)
Married	14	19	
<b>Education</b>			
Uneducated	16	26	1.717 (0.424)
Primary	1	0	
Secondary	11	20	
<b>Age</b>			
11-20	11	10	3.110 (0.540)
21-30	11	22	
31-40	4	9	
41-50	2	4	
51-60	0	1	
<b>Corrosive Agent Used</b>			
Bleach	0	5	6.259 (0.044)
Caustic	6	3	
Ingestion			
Washroom Cleaner	22	38	

**Table 5: Association of Grade injuries in the effected body parts with the corrosive agents used**

Variables	Corrosive Agent	Test statistics	p-value
<b>Effected Organs</b>	<b>Grade Injuries</b>		
Oropharynx		26.904	0.008
Esophagus		31.841	0.004
Stomach		19.177	0.084
Duodenum		10.406	0.109

huge financial strain on poorer countries with inadequate health systems. Corrosive chemicals cause considerable damage to the gastrointestinal tract in the acute phase, which can result in perforation and death.<sup>15</sup> Long-term implications include the creation of strictures and the development of esophageal cancer.<sup>16</sup>

From a preventive perspective, research into the epidemiology of corrosive intake is critical. However, the medical literature on caustic material intake is conflicting and contradictory. Patients with corrosive ingestion have a variety of demographic characteristics, according to several research. Corrosive intake has increased as a result of easy access to corrosive substances and institutional anomalies. The flaws and weaknesses in the policy for laws governing the importation of specific agents, licensing, packaging, and stamping of those agents, permitted or induced these harmful corrosive agents to become the most commonly abused substances in daily life.<sup>17,18</sup>

In the current study, 44.59% of ingestion cases were found in the age groups 11-20 and 21-30 years, which was the highest among the other studied age groups. (Table 2). According to a number of studies from various nations, people in the above mentioned age range are more vulnerable to such incidents.<sup>19-21</sup> It was also observed that education was also a key factor among the reported cases. Number of ingestion cases were directly related to the educational degree of patients. Majority of cases were having primary, less or no education. This observation was in accordance with the one reported by Cibisev.<sup>22</sup> Cibisev documented that the motivation for corrosive agent abuse is dependent on the country's development and the educational level of the patients. Patients with a high level of education and living in developed countries inadvertently ingested the substance.<sup>22</sup>

Further, we also observed a high dominance of women who ingested corrosive agents than the male. (Table 2). The same trend was also documented in various other literature.<sup>21,23,24</sup> Male dominance for most unintentional ingestion/poisoning is also described in most studies.<sup>25-29</sup> However, our study observes an opposite trend. It is vital to investigate the variables that cause such variation. According to the findings of the current study, females are more prone than males to sustain corrosive injuries. This matches the findings of a Taiwanese study, which found that females had a corrosive intake rate of 3.3–6.0 per 100,000 populations, whereas males had a rate of 3.0–5.5 per 100,000 populations. Similar findings have been reported in the Republic of Macedonia and Turkey.<sup>20,21</sup> According to our findings, the vast majority of the subjects ingested corrosive chemicals that had previously been used for cleaning and washing at home. Corrosive goods like bathroom cleaners and laundry bleaches are easily accessible to females because they engage more in cleaning and washing. Furthermore, it was observed that ingestion primarily affected the Oropharynx and Oesophagus with the most frequent Grade Ia and Grade IIb injuries, respectively, as compared to the Duodenum. This could be because corrosive agents most commonly affect the upper GI tract, which includes the oropharynx, larynx, oesophagus, and stomach.<sup>30</sup> It is possible that the caustic consumption had such a negative impact on the oesophagus and stomach that the endoscopic examination was limited to the UGI to avoid oesophageal or gastric perforation. Corrosive injuries to the upper gastrointestinal tract are more common in developing countries<sup>31,32</sup>, and the current study confirmed this trend.

## Conclusion

In developing countries, corrosive consumption is a major public health concern, with a high proportion of suicidal ingestions. It is especially prevalent in suicidal young people with easy access to washroom cleaners. The gravity of the situation emphasises the importance of pursuing multidisciplinary solutions. We can reduce the burden on emergency departments, gastroenterology departments, particularly the endoscopy unit, and surgery

departments due to the admission of patients with corrosive ingestion by controlling its sale and running public awareness campaigns. Education, psychiatric evaluation, and counselling can all help to reduce such incidents. Furthermore, strict action and stringent legislation by governing bodies in developing countries are required to limit adults' unrestricted access to hazardous corrosive elements.

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