

Clinical Spectrum and Implications of Corrosive Oesophageal Injuries in Northern Nigeria

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Abstract

Background: Corrosive ingestion is a serious public health issue associated with high morbidity and mortality. Caustic soda is the most common corrosive substance ingested in developing countries. Caustic soda is used for making soap by local methods in many poor countries, particularly in households with poor or low socio-economic status; this substance is colourless, odourless and usually kept inside bottles and can be confused with water and can be accidentally ingested. This study aimed to evaluate the clinical profile and management of corrosive oesophageal injuries at a referral centre in Kaduna Nigeria. **Methods:** A 9-year (January 2010 to December 2018) retrospective study of patients managed for corrosive oesophageal injuries at a tertiary referral centre in Kaduna. Ethical approval was obtained from the hospital's ethics committee. Patients' medical records were reviewed and relevant information on socio-demographic, clinical features, treatments and complications were obtained. The data was analysed using SPSS version 20. Descriptive statistics was used to ascertain the frequencies and distribution of the variables. **Results:** A total of 15 patients were seen over the study period. The age range was 2-19 years with median of 5.3 years. Nine (60.0%) were males with a M:F ratio of 1.5:1. Majority (93.3%) had accidental ingestion and 53.3% of the ingestions occurred in the neighbourhood. Caustic soda accounted for 86.7% of the ingestions and more than half (53.3%) presented after 48 hours of ingestion (late presentation). Seven (46.7%) developed complications; of these, 4/7 (57.1%) presented after 48 hours of ingestion. Four patients had short segment strictures, three had oesophageal perforation while two died from the complications. **Conclusions:** Corrosive ingestion was mostly seen in male children, majority was accidental ingestion and in most instances caustic soda was implicated. Late presentation was associated with severe complications.

Keywords: Caustic soda; Corrosive injuries; Corrosive oesophagitis; Oesophageal stricture

Introduction

Corrosive ingestion is a serious public health problem associated with high morbidity and mortality [1,2]. It may affect the oral cavity, oropharynx, larynx, oesophagus and stomach, and at times even small bowel may be involved [1,3]. Corrosive ingestions are the common causes of oesophageal strictures in developing countries and the corrosive substances may either be acids or alkalis; the alkalis substance having higher corrosive potentials [4].

Studies have shown a bimodal age distribution of corrosive oesophageal injuries with the first peak commonly seen in children between 1 and 5 years and the second seen after 20 years of age [5-7]. Majority of caustic ingestion cases occur in children below 5 years [5,6]. Approximately 80% of caustic ingestions in children are accidental while most corrosive ingestions in adults are either suicidal, parasuicidal, homicidal or medicinal purposes [4-8].

The most common agents implicated in caustic ingestion are cleaning and dishwasher products and alkalis substance are found in hair straighteners and relaxants [9]. These substances may be freely accessible to children. Caustic soda is used for making soap by local methods in many poor countries, particularly in households with poor or low socio-economic status; this substance is colourless, odourless and usually kept inside bottles and can be confused with water or soft drink and can be accidentally ingested [1,4,8,10,11]. Battery agents are also commonly implicated in corrosive injuries [9]. Thomas et al. [12], in Nigeria reported acids as the commonest aetiological agent in their study.

The primary difference between alkaline and acidic injury is the rapid penetration into the tissue by alkaline agents [4,13]. Alkalis

causes liquefactive necrosis with intense inflammation, dissolution of protein, saponification of fat and thrombosis of the blood vessels of the mucosal layers [13]. Alkaline agents causes severe injuries to squamous epithelium of the oropharynx, hypopharynx and oesophagus with a high tendency of penetrating deep into the tissues resulting in serious complications [13]. Acidic substances cause coagulative necrosis with desiccation and denaturation of tissue protein resulting in eschar formation limiting substance penetration and injury depth [13]. In contrast to the alkalis, acidic agents mostly affects the stomach sparing the oesophagus [13]. This study aimed to evaluate the clinical profile and management of corrosive oesophageal injuries at a referral centre in Kaduna Nigeria.

Patients and Methods

This was a retrospective study of patients managed for corrosive oesophageal injuries at a referral tertiary hospital in Kaduna Nigeria, over a 9-year period (January 2010 to December 2018). Ethical approval was obtained from the hospital's ethics committee. Patients' information were collected from the accident and emergency records, theatre register and ward admission records. The case notes were retrieved

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Received: November 18, 2019; **Accepted:** December 09, 2019; **Published:** December 16, 2019

Citation: Fufore MB, Kirfi AM, Lawal J, Sani M (2020) Clinical Spectrum and Implications of Corrosive Oesophageal Injuries in Northern Nigeria. *Otolaryngol (Sunnyvale)* 10: 388.

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from the medical records department of the hospital and the case notes were reviewed. Information obtained from the patients' case notes include age, gender, type of corrosive substance ingested, duration between corrosive ingestion and presentation to the hospital, reason for ingestion, treatment modality, hospital stay and complications. All patients with history of corrosive substance ingestion were included in the study while those with incomplete information and those whose care notes could not be traced were excluded from the study. The information obtained was analysed using the Statistical Product and Service Solutions (SPSS) software IBM SPSS Statistics for Windows, version 20 (IBM Corp., Armonk, N.Y., USA). Descriptive statistics was used to ascertain the frequencies and distribution of the variables. Quantitative variables were expressed as the means and the standard deviations of the means.

Results

A total of 15 patients were managed for corrosive ingestion during the study period. Their age ranged from 2-19 years with a median age of 5.3 years. Sixty percent were males and 40.0% were females with a M:F ratio of 1.5:1. Table 1 shows socio-demographic distribution of participants.

Majority (93.3%) had accidental ingestion. Only one (6.7%) patient had deliberate ingestions. More than half (53.3%) of the ingestions occurred while playing in the neighbourhood. Caustic soda accounted for 86.7% of the ingestions. Seven (46.7%) presented within 48 hours of ingestion (considered early presentation) while 8 (53.3%) presented after 48 hours (considered late presentation). Eleven (73.3%) of the patients had vomiting induced at home and were given either water or milk before presenting to the hospital. Table 2 gives detailed clinical presentation.

All the patients had intravenous fluids, antibiotics, analgesics, steroids and H-2 receptor blockers. Majority had early insertion of nasogastric tube for stenting and/or feeding. Table 3 gives detail treatment given at presentation.

Seven (46.7%) of the patients developed complications. Of the seven patients that had complications, four (57.1%) had short segment oesophageal stricture and the remaining three (42.9%) had oesophageal perforation. Those with single short segment stricture had serial dilatation and those with oesophageal perforation were referred to cardiothoracic surgery unit and two (13.3%) patients died (Table 4).

	Frequency	Percent
Age group		
0-5 years	11	73.4
6-10 years	2	13.3
11-15 years	0	0
16-20 years	2	13.3
Total	15	100
Gender		
Male	9	60
Female	6	40
Total	15	100
SES of parents		
Poor	12	80
Affluent	3	20
Total	15	100

SES = Socio-economic status

Table 1: Socio-demographic distribution.

Symptoms	Present		Absent	
	Frequency	Percent	Frequency	Percent
Dysphagia	10	66.7	5	33.3
Odynophagia	10	66.7	5	33.3
Drooling	10	66.7	5	33.3
Dyspnoea	1	6.7	14	93.3
Induced vomiting	11	73.3	4	26.7
Fever	6	40	9	60
Dysphonia/Aphonia	0	0	15	100
Hoarseness	1	6.7	14	93.3
Stridor	1	6.7	14	93.3

NB: Note that most patients had more than one symptom

Table 2: Clinical presentations of patients.

Treatment given	Yes	No
	Frequency (%)	Frequency (%)
Intravenous fluids	15 (100)	0 (0.0%)
Antibiotics	15 (100)	0 (0.0%)
Analgesics	15 (100)	0 (0.0%)
H-2 receptor blockers	15 (100)	0 (0.0%)
Steroids	14 (93.3)	1 (6.7)
Early NG tube insertion	10 (66.7)	5 (33.3)
Tracheostomy	1 (6.7)	14 (93.3)

NG = Nasogastric

Table 3: Treatment given at presentation.

Complications	Outcome	Frequency	Percent
Nil complications	Recovered	8	53.3
	Died	0	0
Short segment stricture	Recovered	4	26.7
	Died	0	0
Perforation	Recovered	1	6.7
	Died	2	13.3

Table 4: Complications of corrosive oesophageal injuries.

Three out of the four (3/4, 75.0%) patients with oesophageal stricture and one out of the three (1/3, 33.3%) patients with oesophageal perforation presented to the hospital after 48 hours (i.e. late presentation). The minimum hospital stay was two days and the maximum was 93 days with a median of 21.3 days.

Discussion

Studies have shown that the age of occurrence of corrosive oesophageal injuries presents in a bimodal fashion with the first peak commonly seen in children between 1 and 5 years old (mostly accidental) and the second, usually with suicidal intent are seen after 20 years of age [5-7]. At 2-5 years, children have developed skills and they usually know where to locate and drink liquids; however, they cannot distinguish between harmful or toxic and non-harmful liquids [14,15]. The age of patients in this present study ranged from 2-19 years and 73.4% were between 2 and 5 years; and 93.3% of the cases were accidental. In contrast to this finding, Adedeji et al. [4], in Ogun, Southwest Nigeria reported that 75.0% of the patients they studied were adults and 20 (71.4%) of the cases were deliberate. Similarly, Ogunleye et al. [10], in Ibadan, Southwest Nigeria reported that majority, 17 (73.9%) were below 20 years and 60.0% of the cases in those between 1 and 10 years were accidental. They further reported that 75.0% of

those patients aged between 15 and 20 years ingested the substance with suicidal intent. Onotai et al. [14], in Port Harcourt, South-south Nigeria also reported that 23 (76.7%) of the patients admitted within the study period were adults and half of them (50.0%) ingested the corrosive substance to cause self-harm or commit suicide.

The predisposing factors to suicidal ideation and use of corrosive substance to commit suicide include psychiatric illnesses, substance abuse, chronic illnesses, sexual abuse and economic burden [4,9,15-18]. The prevalence of suicidal ideation in Nigeria is as high as 7.3%, [16] and available studies showed that incidences of suicide or suicide attempt are commoner in the Southern part of Nigeria [4,10,14]. The very low incidence of deliberate ingestion of corrosive substance noted in this present study may suggest that rate of suicide attempt is low in this part of the country compared to the southern part. This difference may be due to cultural and religious beliefs with respect to the consequences of committing suicide. It is widely believed in the North that whoever commits suicide would never make heaven [19]. This may explained the difference in terms of number of cases, age at presentation and reasons for ingesting the corrosive substance noted between this current study and the studies mentioned above.

Available studies have shown higher male preponderance in cases of corrosive injuries [8,10,14]. This current study revealed that 60.0% of the patients were males. Ekpe and colleague [8], in Uyo Nigeria also reported a male female ratio of 4.3:1. Similarly, Ogunleye et al. [10], in Ibadan, South-western Nigeria and Onotai et al. [14], in Port-Harcourt, South-southern Nigeria reported a male preponderance of 74.0% and 80.0% respectively. This finding may suggest that males are more exposed to dangers due to their inquisitiveness and tendency of willing to explore everything within their environment compared to the females. However, Rehman et al. [20], in Pakistan reported equal number of males to females. This may be due the difference in methodology used in their study. Their study was a prospective study and included only patients with oesophageal stricture from caustic injury.

Studies have shown that incidences of accidental corrosive injuries are commoner in developing countries and mostly seen in those who are illiterates with poor socio-economic status [1,4,21]. Eighty percent of the patients in this study were from poor socio-economic status (Table 1). Caustic soda is used for local soap making in many households with poor or low socio-economic status; this substance is colourless, odourless and usually kept inside bottles and can be confused with water or soft drink and can be accidentally ingested [1,4,8,10,11]. Further, studies have also shown that most cases of accidental caustic ingestions occurred in neighbourhood [1,4]. In this study, 53.3% of the ingestions occurred in the neighbourhood. Botwe et al. [1], in Ghana reported that 49.1% of the caustic ingestions occurred in the neighbourhood. Adedeji et al. [4], in Nigeria also reported that 71.4% of the accidental ingestions in their study occurred while playing in the neighbourhood. Therefore, there is need to enlighten or educate the society, particularly the illiterates with poor socio-economic status that are engaged in local soap making to know the dangers of keeping these kind of substances at home or at areas or places within the reach of children. Furthermore, there is also need for strict and effective legislative actions on caustic soda and other corrosive substance use to further protect vulnerable children from ingestion of these substances and its possible complications.

In this study, seven (46.7%) patients had complications. Of these, four patients had oesophageal strictures and the remaining three had oesophageal perforation. Mortality from complications of corrosive

ingestion in this present study was up to 13.3%. Adedeji et al. [4], in Osun South-west Nigeria reported that 12/28 (42.9%) patients they studied developed stricture and in majority, the strictures were long segment types and multiple. They reported a mortality of 7.1%. Similarly, Ekpe and Ette [8], in Akwa Ibom South-south Nigeria studied 16 patients with caustic injuries and they reported that 8/16 (50.0%) patients had complications; and of this, three and four patients had long and short segment strictures respectively, and one patients developed extensive oesophagogastrroduodenal stricture from acid ingestion. They further reported one (6.2%) mortality. Ogunleye et al. [10], in Ibadan reported that 11 (47.8%) of their patients had complications (laryngeal stenosis and oesophageal stricture). Onotai and Nwogbo [14], in Port Harcourt reported 7 (23.3%), 2 (6.7%), 6 (20.0%), 12 (40.0%) and 3 (10.0%) patients with no complications, chemical pneumonitis, hypoglycaemia, oesophageal stricture and death respectively. They further revealed that all those that developed stricture, had short segment stricture.

Conclusion

Corrosive ingestion was mostly seen in male children, majority was accidental ingestion and in most instances caustic soda was implicated. Early presentation and prompt commencement of treatment ensures favourable outcome. Late presentation was associated with severe complications and prolonged hospital stay.

Limitation

The study used relatively small sample size.

Conflict of Interest

None.

References

1. Botwe BO, Anim Sampong S, Sarkodie BD, Antwi WK, Obeng Nkansah J, et al. (2015) Caustic soda ingestion in children under-5 years presenting for fluoroscopic examinations in an Academic Hospital in Ghana. *BMC Res Notes* 8: 1-7.
2. Kluger Y, Ishay OB, Sartelli M, Katz A, Ansaloni L, et al. (2015) Caustic ingestion management: world society of emergency surgery preliminary survey of expert opinion. *World J Emerg Surg* 10: 48.
3. Han Y, Cheng QS, Li XF, Wang XP (2004) Surgical management of oesophageal stricture after caustic burns: a 30 years of experience. *World J Gastroenterol* 10: 2846-2849.
4. Adedeji TO, Tobih JE, Olaosun AO, Sogebi OA (2013) Corrosive oesophageal injuries: a preventable menace. *Pan Afr Med J* 15: 11.
5. De Lusong MA, Timbol AB, Tuazon DJ (2017) Management of esophageal caustic injury. *World J Gastrointest Pharmacol Ther* 8: 90-98.
6. Lupa M, Magne J, Guarisco JL, Amedee R (2009) Update on the diagnosis and treatment of caustic ingestion. *Ochsner J* 9: 54-59.
7. Satar S, Topal M, Kozaci N (2004) Ingestion of caustic substances by adults. *Am J Ther* 11: 258-261.
8. Ekpe E, Ette V (2012) Morbidity and Mortality of Caustic Ingestion in Rural Children: Experience in a New Cardiothoracic Surgery Unit in Nigeria. *ISRN Paediatr* 210632: 1-4.
9. Park KS (2014) Evaluation and Management of Caustic Injuries from Ingestion of Acid or Alkaline Substances. *Clin Endosc* 47: 301-307.
10. Ogunleye AO, Nwaorgu OGB, Grandawa H (2002) Corrosive oesophagitis in Nigeria: clinical spectrums and implications. *Trop Doct* 32: 78-80.
11. Lionte C, Sorodoc L, Petri OR, Sorodoc V (2007) Unusual Presentation and Complication of Caustic Ingestion, Case Report. *J Gastrointest Liver Dis* 16: 109-112.
12. Thomas MO, Ogunleye EO, Somefun O (2009) Chemical injuries of the oesophagus: aetiopathological issues in Nigeria. *J Cardiothorac Surg* 4: 56.

13. Contini S, Scarpignato C (2013) Caustic injury of the upper gastrointestinal tract: A comprehensive review. *World J Gastroenterol* 19: 3918-3930.
14. Onotai LO, Nwogbo AC (2010) Pattern of corrosive ingestion injuries in Port Harcourt: A ten year review. *Niger Health J* 10: 22-25.
15. Gumaste VV, Dave PB (1992) Ingestion of corrosive substances by adults. *Am J Gastroenterol* 87: 1-5.
16. Adewuya AO, Ola BA, Coker OA, Atilola O, Zachariah MP, et al. (2016) Prevalence and associated factors for suicidal ideation in the Lagos State Mental Health Survey, Nigeria. *B J Psych* 2: 385-389.
17. Chirica M, Resche-Rigon M, Bongrand N, Zohar S, Halimi B, et al. (2012) Surgery for Caustic Injuries of the Upper Gastrointestinal Tract. *Ann Surg* 256: 994-1001.
18. Grossman DC, Malligan BC, Deyo RA (1991) Risk Factors for Suicide Attempts among Navajo Adolescents. *Am J Public Health* 81: 870-874.
19. <https://islamqa.info/en/answers/111938/ruling-on-committing-suicide-because-of-depression>
20. Rehman S, Hameed H, Khan IM (2007) Endoscopic Dilatation for Caustic Esophageal Strictures. *JPMI* 21: 292-295.
21. Contini S, Swarray-Deen A, Scarpignato C (2009) Oesophageal Corrosive Injuries in Children: a forgotten social and health challenge in developing countries. *Bull World Health Organ* 87: 950-994.