The Outcome of Patients Poisoned with Corrosive Substances in Minia University Hospital: A Retrospective Study

Eman Shaaban Mahmoud[1], Asmaa S. Taghian[1], Shinooda R Megaly[2] and Mohammed Bakr Ahmed Sarhan[1]

KEYWORDS
Dormex,
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Burn,
Potash,
Phenol.

ABSTRACT

Corrosive poisoning in both children and adults is a worldwide issue that is particularly common in developing countries such as Egypt. This study aimed to assess the hazardous effects of corrosive substances and evaluate the outcome of these cases in the Poison Control Center of Minia University Hospital. From 1st January 2019 to 31st December 2021, all corrosive patients who were admitted to the Poison Control Center of Minia University Hospital were included in the study. All required data regarding socio-demographic information, poisoning data, type of toxic agent, clinical assessment, and outcome were recorded and statistically analyzed. The commonest corrosive substance was sodium hypochlorite (31.3%), followed by dormex (hydrogen cyanimide) (30.4%) and potash (potassium hydroxide) (13.2%). The total number of cases enrolled in this study was 128 cases. Most exposure occurred accidentally (95.3%) and by ingestion (62.5%), among males (63.3%), living in rural areas (63.3%). Most patients were children (79.7%) and below the school age (48.4%). The average delay time was 39.49±18.54 min and common symptoms were nausea/vomiting (68.8%), dysphagia (68%), skin burn (35.1%), and respiratory distress (26.6%). All laboratory investigations done to the patients were normal apart from mild anemia and leukocytosis seen in most cases. The majority of patients (94.5%) had a positive outcome. The mortality rate was 5.4%. We concluded that corrosive exposure is a critical issue that needs to be addressed. It is noteworthy that prompt diagnosis and management are crucial in improving the prognosis of corrosive patients.

Introduction

Corrosive poisoning is a major health problem and medical emergency all over the world that is particularly common in developing countries (Kalayarasan et al., 2019). Although exposure to corrosive agents is not age-specific, children are particularly vulnerable to the harmful effects of these agents. This susceptibility contributes significantly to the high mortality rate among children under the age of five (Kluger et al., 2015).

Ingestion of corrosive substances accounts for about 15,000 annual exposures reported in the USA and for more than 40,000 cases in England (Hashmi et al., 2018). Such data are usually not available in developing countries; however Sobeeh et al. (2018) reported that corrosive ingestion constitutes approximately 58% of pediatric admission in the Middle Delta Poison Control Center in Egypt.

A wide range of physical and chemical agents may cause corrosive injury. The clinical presentation in corrosive ingestion is highly variable. The type, concentration, amount of the corrosive agent along with the period of tissue contact, all affects how severe the corrosive injuries are (Vezakis et al., 2016). Typically, early signs and symptoms usually are not related to the

[(1)] *Forensic Medicine & Clinical Toxicology Department, Faculty of Medicine, Minia University, 61511, El-Minia, Egypt.*
[(2)] *Plastic Surgery Department, Faculty of Medicine, Minia University, 61511, El-Minia, Egypt*

severity of injury and the possibility for later complications as about 20%-45% of patients may have normal physical examinations (Gautam et al., 2018).

Ingestion of corrosive compounds can cause immediate tissue damage, which may result in severe pain, ulcerations, oro-pharyngeal burn, drooling, dysphagia and vomiting. Localized irritation or burn could occur following dermal and ocular exposure. Aspiration of the agent or the inhalation of corrosive gases may irritate the upper and lower respiratory tracts causing cough, dyspnea, stridor, wheezing, and chest crepitation (Agarwal et al., 2020).

This study aimed to assess the hazardous effects of corrosive substances and evaluate the outcome of these cases in the Poison Control Center of Minia university hospital from January, 2019 to December, 2021.

Patients and methods

This hospital-based retrospective study involved 128 patients (81 males and 47 females) who were aged between 2 and 49 years and presented to the Poison Control Center (PCC) of Minia University Hospital during the period from 1st January 2019 to 31st December 2021.

The Scientific Research Ethics Committee of the Faculty of Medicine at Minia University has granted us approval (number 547-2022).

All symptomatic patients, irrespective of their age or sex, with a history of exposure to corrosive agents were included in the study. Certain patients were excluded from the analysis to ensure the integrity of the findings. Specifically, patients with mixed ingestions and those who received treatment before arrival at PCC, as well as patients with an unconfirmed diagnosis and those who were discharged against medical advice upon request, were not included in the study cohort.

All required data were obtained from the patient files, including socio-demographic data (age, sex, residence, occupation, level of education, marital status, associated chronic diseases and habits), poisoning data (time and route of exposure and mode of intoxication), type of corrosive agent, clinical assessment, investigations done (routine laboratory investigations and barium swallow), and detection of outcome (duration of hospital stay, complete improvement in PCC without intervention, need for plastic consultation, need for endoscopy, or death).

Statistical analysis

Version 26 of the SPSS program (Statistical Package for Social Sciences) was used to statistically analyze the obtained data. The qualitative data was expressed as numbers and percentages, while the quantitative data was expressed as mean ± SD with a minimum and maximum range. A one-way ANOVA was performed to analyze the quantitative data. Chi-square analysis was used to examine qualitative data. A difference was deemed significant if the P value was less than 0.05.

Results:

The most frequent corrosive substance was sodium hypochlorite (31.3%), followed by dormex (hydrogen cyanamide) (30.4%), potash (potassium hydroxide) (13.2%), vinegar (10.9%), concentrated sulfuric acid (9.3%), and lastly phenol (4.6%) (Table 1). The current retrospective study was conducted on 128 patients aged 2 years to 49 years old. Most of the patients were children younger than 10 years (64.8%); however, more elderly patients were seen with dormex exposure (Table 2).

Table (1): Percentage of corrosive agents in poisoned patients (n: 128 patients)

Corrosive agents	n=128	Percentage (%)	P value
Vinegar	14	10.9%	
Conc. sulfuric acid	12	9.3%	
Potash	17	13.2%	0.000*
Dormex	39	30.4%	
Sodium hypochlorite	40	31.3%	
Phenol	6	4.6%	

** P>0.05: Non-significant - P<0.05: Significant - P<0.01*: highly Significant. n=number*

Table (2): Description of ages among all corrosive agents' groups by Chi-square test (n: 128 patients)

Agent / Variables	1-10 years	11-20 years	21-30 years	31-40 years	41-50 years	Mean ± SD	P value
Vinegar	10	0	0	0	0	4±1.1	
Conc. sulfuric acid	12	0	0	0	0	4.7±2	
Potash	17	0	0	0	0	4.9±2.1	0.000*
Dormex	0	21	10	3	5	23±10.2	
Sodium hypochlorite	38	2	0	0	0	5.2±2.7	
Phenol	2	2	2	0	0	14±7.3	
Total (%)	83 (64.8%)	25 (19.5%)	12 (9.37%)	3 (2.34%)	5 (3.90%)		

** P>0.05: Non-significant - P<0.05: Significant - P<0.01*: highly Significant. SD= standard deviation, Conc. sulfuric acid: Concentrated sulfuric acid*

According to table (3), showing the socio-demographic data of the patients, there were noticeably more males (63.3%) than females (36.7%), and the majority of cases came from rural areas (63.3%). Most patients were children (79.7%), and 20 individuals (15.6%) were employed, while there were 6 individuals (4.7%) who were not employed at that time. Out of the total number of patients, 48.4% were below school age; 49 patients were enrolled as students (38.3%); 9 patients attended high school (7%); and 8 patients (6.3%) lacked formal education. In terms of their marital status, 18 patients (14.1%) were not married, while 6 patients (4.7%) were in a married relationship, and 2 patients (1.6%) were either divorced or widowed. 4 patients (3.1%) were known to be hypertensive, 2 patients (1.6%) were diabetic, and 4 patients (3.1%) were cigarette smokers.

Table 3: Description of socio-demographic data of corrosive patients by Chi-square test (n: 128 patients)

Variables		n=128	Percentage (%)	P value
Sex	Male	81	63.3%	0.526
	Female	47	36.7%	
Residence	Rural	81	63.3%	0.000*
	Urban	47	36.7%	
Occupation	Child	102	79.7%	0.000*
	Unemployed	20	15.6%	
	Employed	6	4.7%	
Marital status	Child	102	79.7%	0.000*
	Single	18	14.1%	
	Married	6	4.7%	
	Divorced/widow	2	1.6%	
Level of Education	Below school age	62	48.4%	0.000*
	Student	49	38.3%	
	High school	9	7%	
	Non-educated	8	6.3%	
Associated chronic diseases	DM	2	1.6%	0.462
	Hypertension	4	3.1%	0.093
Habits	Smoking	4	3.1%	0.109

** P>0.05: Non-significant - P<0.05: Significant - P<0.01*: highly Significant. n=number*

Most corrosive exposure occurred accidentally (95.3%), while only 4.6% were suicidal. The main route of exposure was through ingestion (62.5%), with a smaller portion being exposed through both ingestion and dermal contact (28.9%). Dermal exposure alone accounted for 6.2% of patients, while inhalation was responsible for only 2.3% of cases (Table 4).

Table (4): Description of mode and route of poisoning in all studied patients (n: 128 patients)

Variables		n=128	Percentage (%)	P value
Mode of poisoning	Accidental	122	95.3%	0.003*
	Suicidal	6	4.6%	
Route of poisoning	Ingestion	80	62.5%	0.000*
	Inhalation	3	2.3%	
	Dermal	8	6.2%	
	Combined ingestion & dermal	37	28.9%	

** P>0.05: Non-significant - P<0.05: Significant - P<0.01*: highly Significant. n=number*

Table (5) lists the time of corrosive exposure and the reported clinical manifestations. Among all cases, the average delay time was 39.49±18.54 min, ranging from a minimum of 20 minutes to a maximum of 1.5 hours. The shortest delay time was observed with vinegar (50.7±35.8 min), while the delay time for concentrated sulfuric acid was the highest (60±16 min). The poisoned cases were commonly presented with nausea

or vomiting (68.8%), dysphagia (68%), skin burn (35.1%), respiratory distress (26.6%), lip edema (24.4%), GIT bleeding (8.6%), and coma (3.9%).

Table (5): Statistical analysis of the time of corrosive exposure and clinical manifestations among patients of the current study by Chi-square test (n: 128 patients)

Variables / Agent	Time of exposure (minutes) (Mean ± SD)	Nausea/ vomiting	Dysphagia	GIT bleeding	Respiratory distress	Coma	Skin burn	Lip edema
Vinegar	50.7±35.8	6 (4.7%)	5 (3.9%)	2 (1.6%)	8 (6.3%)	0 (0.0%)	0 (0.0%)	8 (6.3%)
Concentrated sulfuric acid	60±16	8 (6.3%)	7 (5.5%)	3 (2.3%)	4 (3.1%)	0 (0.0%)	12 (9.4%)	2 (1.6%)
Potash	32.6±7.7	14 (10.9%)	10 (7.8%)	0 (0.0%)	3 (2.3%)	0 (0.0%)	0 (0.0%)	2 (1.6%)
Dormex	32.8±11.2	36 (28.1%)	28 (21.9%)	1 (0.7%)	1 (0.7%)	5 (3.9%)	3 (2.3%)	1 (0.7%)
Sodium hypochlorite	40±14.7	20 (15.6%)	32 (25%)	5 (3.9%)	18 (14.1%)	0 (0.0%)	30 (23.4%)	18 (14.1%)
Phenol	31.6±4.08	4 (3.1%)	5 (3.9%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Total	39.49±18.54	88 (68.8%)	87 (68%)	11 (8.6%)	34 (26.6%)	5 (3.9%)	45 (35.1%)	31 (24.4%)
P value	0.000*	0.000*	0.044	0.032	0.000*	0.037	0.000*	0.000*

** P>0.05: Non-significant - P<0.05: Significant - P<0.01*: highly Significant. SD= standard deviation*

Tables (6 and 7) describe the complete blood count, arterial blood gas (ABG) analysis, and results of other laboratory investigations done on the patients. All laboratory investigations were normal, apart from the mild anemia and leukocytosis seen in most cases.

Table (6): Analysis of complete blood count and arterial blood gases (ABG) in between the studied groups using one-way ANOVA (n: 128 patients)

Agent / Variables	Number	Hemoglobin (HB) Mean ± SD	WBC'S Mean ± SD	Platelets Mean ± SD	ABG (PH) Mean ± SD
`Vinegar	14	10.08±0.94	12±1.63	237.7±53.2	7.38±0.03
Concentrated sulfuric acid	12	9.7±1.46	11.9±1.31	232.7±62	7.38±0.025
Potash	17	10.6±0.29	12.4±1.3	227.2±46.9	7.39±0.03
Dormex	39	10.3±0.71	11.9±1.6	229.6±57.9	7.39±0.03
Sodium hypochlorite	40	10±1.2	11.6±1.6	255±66.2	7.39±0.03
Phenol	6	10.9±0.72	11.3±1.3	207±57.7	7.38±0.021
P value		0.07	0.608	0.283	0.854

** P>0.05: Non-significant - P<0.05: Significant - P<0.01*: highly Significant. n=number, SD= standard deviation, WBC'S= white blood cells, ABG= arterial blood gases.*

Table (7): Analysis of other laboratory investigations between the studied groups using One-way ANOVA (n: 128 patients)

Variables \ Agents	Number	ALT Mean ± SD	Creatinine Mean ± SD	Na Mean ± SD	K Mean ± SD	Prothrombin time Mean ± SD
Vinegar	14	25±6.05	0.91±0.32	138.4±2.1	4.15±0.47	11.9±0.31
Concentrated sulfuric acid	12	20.5±.9.7	1±0.25	139.8±2.5	4±0.37	11.9±0.48
Potash	17	21±5.4	0.98±0.36	139.4±2.98	4.02±0.27	11.9±0.53
Dormex	39	22±7.06	1.02±0.34	138.8±2.63	4.1±0.42	11.8±0.46
Sodium hypochlorite	40	22.9±6.2	1.04±0.31	139.4±2.92	3.6±0.46	11.8±0.47
Phenol	6	19.7±2.7	0.77±0.16	139.8±3.66	4.03±0.49	12.3±0.15
P value		0.386	0.375	0.685	0.00**	0.253

** P>0.05: Non-significant - P<0.05: Significant - P<0.01*: highly Significant. n=number, SD= standard deviation, ALT= Alanine transaminase.*

In this study, the mean hospital stay was 4.65±2.17days ranging from 1 to 9 days. The majority of patients (94.5%) had a positive outcome. The mortality rate was 5.4%; however, no deaths were reported with potash or phenol exposure (Table 8). The primary complication frequently observed was stricture formation, which was identified through barium swallow and necessitated surgical consultation for endoscopy. Stricture development predominantly occurred following the ingestion of sodium hypochlorite and vinegar (Figures 1, 2). Additionally, plastic consultation was required in 12 cases (9.4%), with skin burns often caused by the use of concentrated sulfuric acid and dormex (Figures 3, 4).

Table (8): Statistical analysis of the duration of hospital stay and the outcome in the studied patients by chi-square test (n: 128 patients)

Variables / Corrosive agents	Hospital stay (days) Mean ± SD	Outcome percentage (%)				P value
		Survived			Dead	
		Discharged without intervention	Needed intervention			
			Endoscopy	Plastic consultation		
Vinegar	6.08±1.5	9 (7%)	3 (2.3%)	0 (0.0%)	2 (1.6%)	0.469
Conc. sulfuric a	5.9±1.2	0 (0%)	2 (1.6%)	9 (7%)	1 (0.7%)	
Potash	3.45±2.52	16 (12.5%)	1 (0.7%)	0 (0.0%)	0 (0.0%)	
Dormex	6.35±1.32	35 (27.3%)	0 (0.0%)	3 (2.3%)	1 (0.7%)	
Sodium hypo.	4.54±1.42	31 (24.2%)	6 (4.7%)	0 (0%)	3 (2.3%)	
Phenol	3±1.09	6 (4.7%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Total	4.65±2.17	97 (75.8%)	12 (9.4%)	12 (9.4%)	7 (5.4%)	
		121 (94.5%)			7 (5.4%)	

** P>0.05: Non-significant - P<0.05: Significant - P<0.01*: highly Significant. SD= standard deviation,* Conc. sulfuric a.: concentrated sulfuric acid, Sodium hypo.: sodium hypochlorite

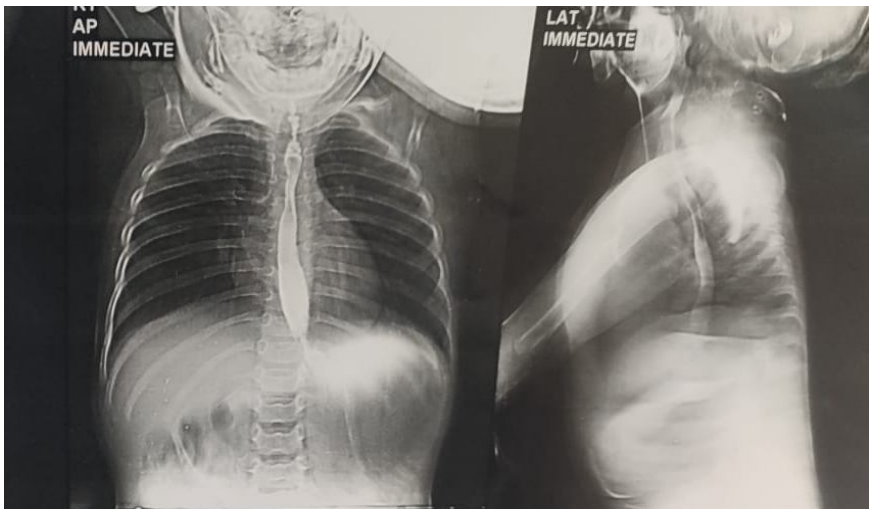

Fig. (1): A contrast study of the hypopharynx and esophagus after ingestion of sodium hypochlorite revealed a short segment of benign stricture involving the distal part of the esophagus, including the gastroesophageal junction associated with proximal esophageal dilatation.

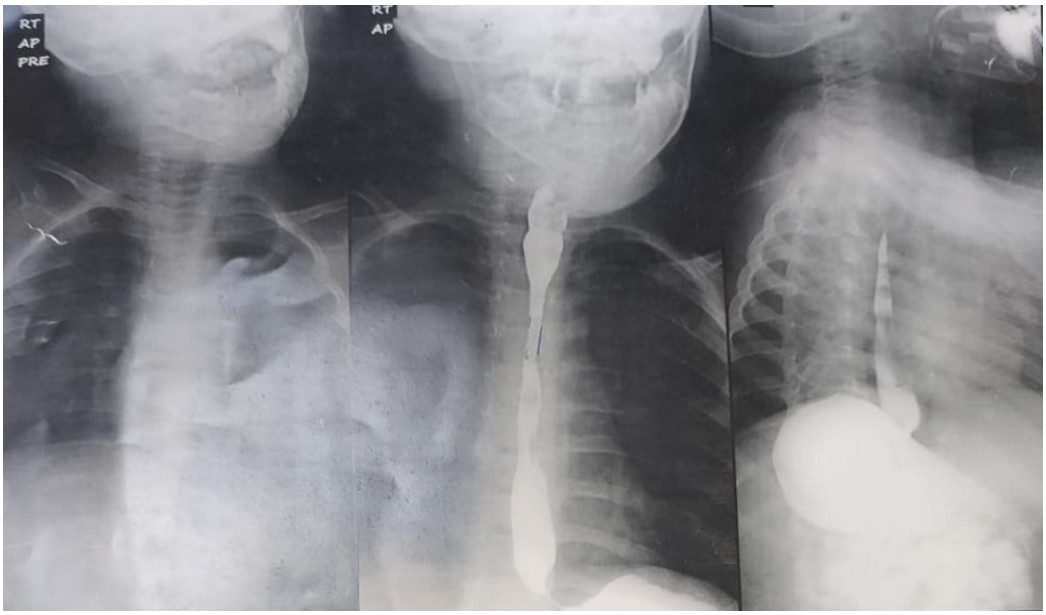

Fig. (2): A contrast study of the hypopharynx and esophagus after ingestion of vinegar showed a long segment of irregular stricture involving the middle 1/3 of the esophagus and significant encroaching on the lumen of the esophagus with a mildly dilated esophagus proximal to the stricture segment.

Fig. (3): Female patient 12 years old with scald burns about 10% at the back and posterior aspect of the right upper limb following exposure to dormex, superficial partial to deep partial burn, healed by repeated dressing.

Fig. (4): Concentrated sulfuric acid patient, a 3-year-old male with scald burns about 10 % at the back, chest, and right thigh, superficial partial to deep burn, healed with repeated dressing.

Discussion:

Corrosive poisoning in both children and adults is a prevalent issue. The goal of this study was to study the hazardous effects of corrosive substances and evaluate their outcomes. That was achieved by utilizing retrospective data collected from 128 cases who presented to the Poison Control Centre (PCC) of Minia University Hospital with a history of exposure to corrosive agents during the period from 1st January 2019 to 31st December 2021.

The current study listed sodium hypochlorite as the most frequently used corrosive agent (31.3%) among the studied cases, followed by dormex (30.4%), potash (13.2%), vinegar (10.9%), and analyzing conc. sulfuric acid (9.3%), and lastly, phenol (4.6%). Similar findings were reported by Ali and Abo El Wafa (2020), who stated that the most common corrosive substance used by the studied patients was sodium hypochlorite (60.8%), followed by phenol (23.7%). Also, this went with what was found in a study conducted in Saudi Arabia by Al-Binali et al. (2009), which demonstrated that sodium hypochlorite constituted 50% of the poisoned patients.

Several studies observed that the prevalence of alkalis was higher than that of acids in most poisonings (Adedeji et al., 2013; Rafeey et al., 2016). On the contrary, Vijay Kumar et al.'s (2019) Indian study revealed that acids were used in the majority of cases of corrosive ingestion (75%). Chibishev et al. (2012) believed that ingested acids were more prevalent than alkalis, with hydrochloric acid accounting for the bulk of cases (48.2%), while sodium hypochlorite was less common (20.27%).

Strong acids cause coagulative necrosis of the mucosa, which limits deeper tissue penetration and decreases damage. The effects of acids are more noticeable in the stomach than in the esophagus because of the formation of hard esophageal eschar and the increased gastric contact time due to pyloric spasms (Chirica et al., 2017). Alkalis, on the other hand, cause liquefactive necrosis, which increases the risk of deeper tissue penetration, resulting in severe injuries at all levels of the GIT, especially the esophagus (Kalayarasan et al., 2019).

The patients enrolled in the study were between 2 and 49 years old. Most of the patients were children under 10 years old (64.8%); however, more elderly patients were seen with dormer exposure, which is a plant growth regulator with corrosive effects on the skin and eyes. The increased incidence of corrosive poisoning in children is mostly a result of their accessibility and easy availability as household agents. The children's exploratory activity and their desire to put objects in their mouths may also play a role (Uygun, 2015).

This was in agreement with Rafeey et al.'s (2016) study, which found that children of preschool age were at the highest risk, with a mean age of 3.70.1 years. Additionally, this was consistent with the finding of the Mahmoud et al. (2019) study showing that the maximum incidence (66.3%) of corrosive poisoning occurred in children under the age of five.

In Pakistan, a study carried out by Hashmi et al. (2018) stated that 80.1% of corrosive ingestion was in the age group between 15 and 30 years, which contrasts the findings of the current study.

As regards gender, there were noticeably more males (63.3%) than females (36.7%); however, this difference was statistically non-significant. The higher frequency of corrosive ingestion in males was also observed by several studies. Elhelaly et al. (2022) stated that there was a slight male predilection among their studied groups (51.7–59%).

Ghonem and El Sharaby (2018) also detected that 52.3% of corrosive cases were males as opposed to 47.7% of females. This could be attributed to the curiosity of boys and their inquisitive desire to examine substances more than girls. This suggests that parents should pay more attention and take better care of their boys to prevent such ingesting accidents (Sánchez-Ramrez et al., 2012).

Contrary to the result of the current study, female predominance was noted by El-Salam et al. (2013) among the studied corrosive cases, and they linked this to the fact that females are more likely to come into contact with corrosive substances while cleaning and washing.

In agreement with the results published by Kandeel and El-Farouny (2017), 63.3% of the studied patients resided in rural areas. This can be explained by the poverty, low socioeconomic status, and low educational status of rural people (Millar and Numanoglu, 2012). A contributing cause may be the increased availability of concentrated corrosive agents for use in agriculture (Sharif et al., 2022). This was in contrast with Patil et al.'s (2014) study, which revealed that pediatric patients were mostly from urban areas (77.4%).

Most patients were children (79.7%), and 20 individuals (15.6%) were employed, while there were 6 individuals (4.7%) who were not employed at that time. Out of the total number of patients, 48.4% were children below school age; 49 patients were enrolled as students (38.3%); 9 patients attended high school (7%); and 8 patients (6.3%) lacked formal education. These eight patients were farmers who were accidentally exposed to dormex while they were working on agricultural land.

In terms of their marital status, 18 patients (14.1%) were not married, 6 patients (4.7%) were in a married relationship, and 2 patients (1.6%) were either divorced or widowed. However, it is important to note that the majority of the patients included in this study were children under the age of 10. Parvathi et al. (2016), in their study of corrosive poisoning cases among females, observed that 43.5% of the poisoned females were married, which was inconsistent with the findings of the study.

Four patients (3.1%) were known to be hypertensive, two patients (1.6%) were diabetic, and four patients (3.1%) were cigarette smokers. Patients who had a history of chronic diseases were at a higher risk for complications and unfavorable outcomes compared to patients without such medical backgrounds.

Regarding the mode of poisoning, the vast majority of cases (95.3%) were poisoned accidentally. Only 4.6% of the patients were suicide cases. This goes hand in hand with the results obtained by Mahmoud et al. (2019), who noted that the majority of cases were subjected to poisoning accidentally. Storage of corrosive substances in containers that are not labeled or containers that were previously used for food or beverages while keeping them nearby can explain this (Uygun et al., 2012).

However, Shivakumar and Sumangala (2019) reported that the corrosive ingestion in most patients was suicidal (83.3%).

The main route of exposure was through ingestion (62.5%), with a smaller portion being exposed through both ingestion and dermal contact (28.9%). Dermal exposure alone accounted for 6.2% of patients, while inhalation was responsible for only 2.3% of cases. This was in accordance with studies by El-Salam et al. (2013) and Alije et al. (2014) that showed that the oral route was the most common route of poisoning (85.2% and 81.65%, respectively). This can be explained by the presence of most corrosive agents in liquid form.

During this work, the average delay time was 39.49±18.54 minutes, ranging from a minimum of 20 minutes to a maximum of 1.5 hours. The most commonly reported manifestations were the GIT symptoms, followed by dermal and respiratory manifestations. The poisoned patients presented with nausea and vomiting (68.8%),

dysphagia (68%), and GIT bleeding (8.6%). GIT symptoms were more evident with sodium hypochlorite and dormex exposure. Other symptoms included skin burn (35.1%), respiratory distress (26.6%), lip edema (24.4%), and cases presented with coma (3.9%) that were exclusively observed with dormex, mostly secondary to its neurotoxic effects.

The predominance of gastrointestinal symptoms was in line with other studies done by Vezakis et al. (2016) and Uygun and Bayram (2020).

Airway damage is signaled by respiratory distress and can be caused by the irritating effects of the corrosive substance, which can trigger choking and gagging, potentially leading to respiratory failure (Doherty et al., 2017). Other causes of respiratory distress are the aspiration of corrosive substances into the tracheobronchial tree and hyperventilation, which can be linked to the degree of metabolic acidosis present (Dalus et al., 2013).

All laboratory investigations done to the patients were normal, apart from the mild anemia and leukocytosis seen in most cases. The decline in hemoglobin (Hb) levels was closely associated with the occurrence of hematemesis.

Similarly, a study conducted in South India by Dalus et al. (2013) found that 57.5% of patients poisoned with corrosive substances exhibited leukocytosis within 24 hours of admission. This rise in the total number of white blood cells could be attributed to the pathophysiology of corrosive injury. In the initial stages, edema and eosinophilic necrosis occur, leading to the mobilization of leukocytes as an inflammatory response to the injury. Additionally, bacterial translocation into necrotic tissues may also contribute to an increased white blood cell count (Kaya et al., 2010).

Normal ABG results obtained by the present study were in contrast with a previous study conducted by Elawady et al. (2017). In their research, they found that low blood pH was evident in the complicated corrosive group and was correlated with poor outcomes. Metabolic acidosis may be attributed to hypovolemia and dehydration, which result in anaerobic metabolism and lactic acidosis. The consumption of highly acidic and corrosive substances can also cause metabolic acidosis (Kaya et al., 2010). Metabolic acidosis, particularly when the pH level is below 7.22, is an indication of tissue necrosis and considerable damage (Gharib et al., 2016).

The mean hospital stay was 4.65$\pm$2.17 days, with a range of 1 to 9 days. Patients who experienced comas and required admission to the intensive care unit had the longest length of stay. The current study found a shorter mean hospital stay compared to Hashmi et al.'s (2018) report of 11.8 ± 11.1 days but a longer stay compared to Sharif et al.'s (2022) findings of 23.5$\pm$26.9 hours with a median of 12 hours.

Esophageal strictures are one of the most common consequences of corrosive poisoning (Joshi et al., 2020). In the present study, strictures were evident after barium swallow in 12 patients (9.4%) who were referred for endoscopic dilatation in the surgical department. Sodium hypochlorite constituted 50% of those cases. Results from previous studies revealed that the prevalence of esophageal strictures after corrosive consumption ranges from 10% to 19.5% (Le Naoures et al., 2017).

A consultation with a plastic surgeon was necessary in 12 cases (9.4%) where the skin burns varied from superficial partial to deep partial burns. Exposure to concentrated sulfuric acid was the cause of death in nine patients. Most cases were healed by repeated

dressings with or without the use of healing agents.

In this study, the majority of patients (94.5%) had a positive outcome. The mortality rate was 5.4%. Three deaths (2.3%) were attributable to sodium hypochlorite, two (1.6%) to vinegar, and one (0.7%) to concentrated. sulfuric acid, and one (0.7%) to dormex; however, no deaths were reported with potash or phenol exposure. The reason for this could be that the majority of the patients in this study were children below 10 years old who accidentally consumed smaller quantities of corrosive substances. Conversely, a higher rate of mortality was observed among suicidal individuals who intentionally consumed larger amounts of these caustic substances.

The leading causes of death during the early stage were upper airway edema, aspiration pneumonia, respiratory failure, esophageal and gastric perforations, hematemesis, septicemia, and DIC.

Conclusion and recommendations:

Addressing the problem of corrosive exposure is of utmost importance. It is worth mentioning that early detection and effective treatment play a key role in improving the outcome of corrosive patients. The study was undertaken to highlight the prevalent caustic substances in the Minia governorate and identify which age group was most susceptible to these injuries. These findings will direct efforts to better safeguard these patients and educate parents about the importance of vigilant care for their children, thereby reducing the likelihood of future accidents. This can be accomplished through educational seminars, informative workshops, or leveraging social media platforms to raise awareness. The ultimate goal is to ensure a safer environment for everyone involved.

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نتائج المرضي المصابين بالتسمم بالمواد الآكالة في مستشفي المنيا الجامعي: دراسة بأثر رجعي

ايمان شعبان محمود[1]، اسماء صلاح عبد العظيم تغيان[1]، شنودة رمزي حنا[2]، محمد بكر أحمد سرحان[1]

قسم الطب الشرعي والسموم الاكلينيكية، كلية الطب، جامعة المنيا، ٦١٥١١، المنيا، مصر[1]،
قسم جراحة التجميل، كلية الطب، جامعة المنيا٦١٥١١، المنيا، مصر[2].

يعتبر التسمم بالمواد الآكالة لدى كل من الأطفال والبالغين مسألة عالمية بصفة خاصة في البلدان النامية مثل مصر. تهدف هذه الدراسة لتقييم الآثار الخطرة للمواد الآكالة وتقييم نتائج هذه الحالات في مركز مكافحة السموم بمستشفى جامعة المنيا.أجريت هذه الدراسة علي جميع مرضى التآكل الذين تم إدخالهم إلى مركز مكافحة السموم بمستشفى جامعة المنيا في الفترة من الاول من يناير عام ٢٠١٩ وحتي نهاية شهر ديسمبر عام ٢٠٢١. وسجلت جميع البيانات المطلوبة فيما يتعلق بالمعلومات الاجتماعية - الديمغرافية، وبيانات التسمم، ونوع المادة السامة ، والتقييم السريري، والنتائج، وجرى تحليلها إحصائيا. كانت المادة الآكالة الأكثر شيوعا هي هيبوكلوريت الصوديوم (٣١,٣٪) ، تليها دورمكس (سيانامايد الهيدروجين) (٣٠,٤٪) والبوتاس (هيدروكسيد البوتاسيوم) (١٣,٢٪). بلغ العدد الإجمالي للحالات المسجلة في هذه الدراسة ١٢٨ حالة. في معظم الحالات كان التعرض عرضياً (٩٥,٣٪) وعن طريق الفم (٦٢,٥%) ، بين الذكور (٦٣,٣٪) ، الذين يعيشون في المناطق الريفية (٦٣,٣٪). وكان معظم المرضى أطفالا (٧٩,٧٪) وأقل من سن المدرسة (٤٨,٤ ٪). وبلغ متوسط وقت التأخير ١٨,٥٤ ± ٣٩,٤٩ دقيقة وكانت الأعراض الشائعة هي الغثيان / القيء (٦٨,٨٪) وعسر البلع (٦٨٪) وحرق الجلد (٣٥,١٪) وضيق التنفس (٢٦,٦٪). كانت جميع الفحوصات المختبرية التي أجريت على المرضى طبيعية باستثناء فقر الدم وزيادة عدد الكريات البيضاء التي شوهدت في معظم الحالات. غالبية المرضى (٩٤,٥٪) لديهم نتيجة إيجابية وكان معدل الوفيات ٥,٤ ٪. وخلصنا إلى أن التعرض للمواد الآكالة يعد مسألة بالغة الأهمية تحتاج إلى معالجة. ومن الجدير بالذكر أن التشخيص الفوري والتدخل السريع للعلاج أمران حاسمان في تحسين تشخيص مرضى التآكل.