

Severity of child neglect among acutely poisoned children in Egypt

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Abstract

Background: Child abuse and neglect pose significant public health challenges, contributing to compromised development and adverse health outcomes. Neglect is the most frequent type of child abuse, presenting substantial challenges for paediatricians.

Aims: To identify types of neglect associated with poisoned children, analyse potential risk factors and develop a novel severity scoring system to assess child neglect in Alexandria, Egypt.

Methods: Using a simple random sampling technique, with an observational checklist we collected data on children aged 2 months to 17 years admitted for poisoning at the poison centre of Alexandria Main University Hospital from October to December 2022. We analysed the data using SPSS version 20.0 and tested the associations between neglect score and child data, current condition and carer data using the χ^2 test, the Monte Carlo simulation and Fisher's exact P.

Results: The study enrolled 147 children, male-to-female ratio 1:1.17. Pesticides were the most common cause of poisoning. Lack of supervision was noted in 83% of cases and the neglect severity score showed that 27.9% of the children experienced severe neglect. There was significant association between severity of neglect and caregiver's education level and between severity of neglect and child's residence; severe neglect cases were significantly higher among children whose caregivers had no formal education (70.7%) and among those from rural areas (61%).

Conclusion: These findings highlight the critical need to address educational disparities among caregivers and improve supervision for children, especially in rural areas.

Keywords: child neglect, child supervision, child poisoning, child abuse, pesticide, caregiver, Egypt

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Background

Although physical violence against children often receives more attention due to its visible consequences, child neglect is the most prevalent form of child abuse, with effects that tend to be more enduring (1,2). According to the US Child Protection Knowledge Gateway, child neglect constitutes the most severe form of child abuse (3). Child neglect is considered an act of omission in contrast to child abuse, which is an act of commission (5). Identifying and reporting neglect is challenging due to the lack of professional training and guidelines for recognising it (4). The legal consequences are primarily focused on mistakes made by parents or caregivers which result in actual or potential harm (6,7).

Numerous behaviours define child neglect including ignoring health advice, refusing to seek medical care, denying children food, abandoning them, failing to provide education, maintaining poor hygiene and exposing them to drugs and hazardous environments (8,9).

In a previous study from Egypt, 25% of children in Alexandria and Cairo were found to be directly affected by some form of neglect (4). The risk of child neglect is associated with factors that can be influenced by parents, guardians or the child. Parental variables include social isolation, negative parental experiences, lack of parenting

knowledge or skills, use of psychoactive substances and violent behaviour issues (10,11). Practitioners' ability to anticipate the potential harm of neglect enables the provision of preventive measures before neglect starts or worsens (3,12).

This study aimed to document cases of child abuse and neglect among children admitted to the Alexandria Poison Centre in Egypt, identify the risk factors contributing to child neglect, and develop a severity scoring template for assessing child neglect and predicting its outcomes.

Methods

Setting and sample

We used an observational checklist to collect data directly from caregivers and their children on admission at Alexandria Poison Centre. This unit operates as a sub-unit within Alexandria Main University Hospital. We conducted our study in the unit during the months of October, November and December 2022.

We recruited study participants using a simple random sampling technique. We used Open Epi software (13) to calculate sample size. Previous studies suggested that approximately 10.7% of children experience child abuse or neglect at some point in their life (14).

According to our calculations, we needed to recruit a sample of 147 children to achieve 80% study power and a 95% confidence level.

We recruited exactly 147 (25%) children with acute poisoning out of a potential 588 on admission at Alexandria Poison Centre. We used a random number table as our randomization method. Recruited children ranged in age from 2 months to 17 years with a mean of 6.86 years. More than half of the cases were pre-school age ($n = 83$; 56.5%). Female children constituted 53.7% ($n = 79$) of the sample. Cases from urban areas represented 67.3% ($n = 99$) of the sample. Of the 52% ($n = 77$) of children who had reached educational age, 16.3% ($n = 24$) had never received any type of formal education (Table 1).

Table 1. Demographic characteristics of study participants (n = 147)

Study participants	N (%)
Age (years)	
< 1	11 (7.5)
1–5	83 (56.5)
6–12	12 (8.2)
13–18	41 (27.9)
Gender	
Male	68 (46.3)
Female	79 (53.7)
Type of residence	
Rural	48 (32.7)
Urban	99 (67.3)
Ever attended formal education?	
No	24 (16.3)
Yes	54 (36.7)
Not yet	69 (46.9)

Data collection

We developed an observational checklist of features adapted from various assessment tools on neglect (15,16). We collected data related to the children's demographic data, the poisoning state, physical care, health, safety issues and data related to care giver. Our checklist comprised 5 main sections including:

- i. Demographic data: age, sex, residence and educational state;
- ii. Medical condition on admission: type of poison, time since exposure to poison before seeking or receiving medical advice, unexplained delays in seeking medical advice, unexplained injury, circumstances of the poisoning, abnormal child behaviour, duration of hospital stay, the need for intensive care unit (ICU) admission, the duration of ICU admission and the outcome of each case;

- iii. Caregiver characteristics: educational level, marital status, substance abuse, engaging in violence with a domestic partner or other adult in front of child, attempting suicide in the presence of the child and whether the mother is employed away from the home (working mother);
- iv. Physical appearance or condition of the child: child's clothing, smell, hygiene, nutritional state, disability status and current health issues; and
- v. Child protection and safety: (incidence of accidents inside the home, allowing a young child to leave the home unsupervised, prolonged lack of child supervision or presence of dangerous substances within child's reach.

We conducted key informant interviews to assess the validity and reliability of the checklist before its official implementation. We consulted 3 experts in medical education and research from the Faculty of Medicine at Alexandria University to evaluate the extent to which our revised checklist accurately measures the severity of child neglect and associated risk factors.

The developed severity score

To examine the relationship between child neglect and associated factors, we created a comprehensive scoring system to determine if there was neglect or abuse based on informant responses to a series of assessment questions. The key areas assessed included: (i) receiving education; (ii) delays in seeking medical advice; (iii) behavioural concerns; (iv) physical care; and (v) caregiver safety measures.

Each question was scored as follows:

- **Score of 1:** Indicates neglect (response “No” to the presence of negative care in the area).
- **Score of 0:** Indicates no neglect (response “Yes” to the presence of positive care in the area).

The total neglect score was calculated by summing the scores and severity was classified based on the total percentage score:

- **Severe neglect:** Total percentage score less than 50%.
- **Moderate neglect:** Total percentage score from 50% to less than 75%.
- **Mild or no neglect:** Total percentage score of 75% or more.

This scoring method enabled us to classify the extent of neglect accurately and assess its effects on the child's past and future well-being.

Ethics consideration

We obtained informed consent from all participants, through a signed consent form. The study was approved by the Institutional Review Board of the Faculty of Medicine, Alexandria University for Ethics under approval number IRB 0121026 and FWA number FWA00018699.

Data analysis

Our final dataset was analysed using SPSS version 20.0 (17,18). All categorical data were represented as numbers and percentages. We used χ^2 tests to analyse the association between these variables. Fisher’s Exact Test or Monte Carlo simulations were used when more than 20% of the cells in our data had expected counts less than 5. This ensured that our statistical analysis remained accurate despite the small sample sizes in some categories.

For continuous variables, we used range (minimum and maximum), mean, standard deviation, median and interquartile range (IQR). The associations between neglect score and the child data, current condition and carer data were tested using a χ^2 test, a Monte Carlo simulation and calculation of Fisher’s exact P. We considered results statistically significant at $P = 0.05$ or less.

Results

Current medical condition

Pesticides were the most prevalent toxin, accounting for 27% (n = 40) of poisoning cases, followed by household products with 19% (n = 28) of cases (Table 2). The time from exposure to the poison to seeking medical advice ranged from 30 minutes to 72 hours with a mean of 7.83 hours. Ninety-three (63.3%) children had unexplained delays in seeking medical advice and 24 (16.3%) had unexplained associated injuries. Seventy-three (49.7%) exhibited strange behaviour during examination.

The mean hospital stay duration for the children was 1.89 days and 30 (20.4%) of cases needed ICU admissions with a mean duration of ICU stay of 1.53 days. The outcome in most cases was complete recovery (n = 105; 71.4%) but 39 (26.5%) experienced complications such as burns, gastrointestinal ulcer, pneumonia, liver or cardiac affection. Unfortunately, 3 (2%) of the children died; and in each the cause of death was pesticide poisoning. One hundred and three (70.1%) poisoning cases were found to be accidental whereas 39 (26.5%) were confirmed suicide cases.

Caregiver characteristics

Nearly half of the children (n = 65; 44.5%) had a caregiver with a moderate level of education. Ninety-three (63.3%) of the caregivers were not employed and 15 (10.2%) were not married. Forty-two (28.6%) had a history of substance abuse, 86 (58.5%) said the child had witnessed aggressive conduct toward the mother and 28 (19%) had seen their caregiver attempt suicide (Table 3).

Physical health and appearance of child

Twenty-seven (18.4%) children appeared to be inappropriately dressed; 49 (33.3%) smelled bad; 50 (34%) had poor hygiene, 36 (24.5%) appeared malnourished and 36 (24.5%) had been poisoned or injured in the past. Thirty-six (24.5%) caregivers failed to disclose the current health problems of their children and 18 (12.2%) did not show up for scheduled developmental checks. Fifty-six

(38.1%) children were exposed to frequent accidents inside the home and more than half of children (n = 84; 57.1%) were left outside the home alone daily. One hundred and

Table 2. Medical condition of admitted cases at time of admission (n = 147)

Toxicological substance	N (%)
Pesticide	40 (27.2)
Household products, e.g. corrosives	28 (19.0)
Central nervous system drugs	26 (17.7)
Hydrocarbons	15 (10.2)
Over the counter medications	13 (8.8)
Cardiovascular system drugs	11 (7.5)
Illicit drugs	5 (4.8)
Unknown drugs	4 (1.4)
Snakebite	2 (1.4)
Toxic plants	1 (0.7)
Medicines to treat diabetes (insulin)	1 (0.7)
Carbon monoxide	1 (0.7)
Unexplained delay in seeking medical advice	
No	54 (36.7)
Yes	93 (63.3)
Unexplained injury	
No	123 (83.7)
Yes	24 (16.3)
Need for intensive care unit admission	
No	117 (79.6)
Yes	30 (20.4)
Outcome	
Complete recovery	105 (71.4)
Incomplete recovery with complication	39 (26.5)
Death	3 (2.0)
Circumstances of current poisoning	
Accidental	103 (70.1)
Abuse	2 (1.4)
Suicidal	39 (26.5)
Incorrect medical dose	2 (1.4)
Addict with overdose	1 (0.6)
Observed abnormal child behaviour	
No	74 (50.3)
Yes	73 (49.7)
Duration of hospital stay (days)	
Mean ± SD	1.89 ± 1.70
Median (IQR)	1.0 (1.0– 3.0)
Time since exposure to the toxic substance and seeking medical advice (hours)	
Mean ± SD	7.83 ± 9.80
Median (IQR)	5.0 (2.0–9.0)
Duration of ICU admission (days)	
Mean ± SD	1.53 ± 1.51
Median (IQR)	1.0 (0.5–2.0)

IQR = Interquartile range; SD = Standard deviation

Table 3. Caregiver characteristics (n = 147)

Caregiver data	N (%)
Education level	
High	26 (17.7)
Moderate	65 (44.2)
Low	56 (38.1)
Marital status	
Married	132 (89.9)
Separated/divorced/widowed	15 (10.2)
History of substance abuse	
No	105 (71.4)
Yes	42 (28.6)
Child witnessed violence against caregiver from a domestic partner or other adult	
No	61 (41.5)
Yes	86 (58.5)
Child witnessed caregiver attempt suicide	
No	119 (81.0)
Yes	28 (19.0)
Working mother	
No	93 (63.3)
Yes	54 (36.7)

twenty-two children (83%) experienced episodic lack of supervision and 141 (95.9%) were regularly exposed to dangerous substances.

Child neglect severity score

Based on our scoring method, total scores ranged from 2.0 to 13.0 with a mean of 8.60 ± 2.54 SD. Forty-one (27.9%) admitted children were classified as severe neglect, 89 (60.5%) as moderate neglect and 17 (11.6%) as minimal neglect (scores over 75%; Figure 1).

Table 4 shows the association between the severity of child neglect and child and caregiver data. There was a significant association between severity of neglect and child's residence; 61% (n = 25) of cases of severe neglect were from rural areas, 31.7% (n = 13) required ICU admission whereas only 16% (n = 17) of children who reported mild to moderate neglect required ICU admission. There were no other significant differences associated with the severity of neglect and other data on admitted children.

There was a significant association between the severity of neglect and caregiver education level; severe neglect cases were significantly higher among children with caregivers who had never received any type of formal education (n = 29; 70.7%). Thirty-nine (95.1%) of children we classified as severe neglect cases had caregivers who were stay-at-home and unemployed.

Discussion

Young children are particularly vulnerable to poisoning due to their natural curiosity and developmental stage (19-21). While serious accidents involving children receive significant attention, the severity of neglect they experience is less documented. It is crucial to recognise that accidental poisonings and neglect are preventable (19). Neglect is known to be the most prevalent form of abuse among children (22).

Inadequate supervision leading to exposure to hazards, medical neglect, delayed healthcare, inappropriate caregivers with substance abuse issues, emotional neglect and caregivers permitting drug or alcohol use are common forms of neglect seen in poison centres. In our study, more than half of the cases were among children aged 1-5 years, similar to findings in Egypt (23,24) and Qatar (25), indicating that neglect often involves young children who rely heavily on parental support.

Figure 1. Severity-based classification of child neglect among admitted patients using a novel scoring system (n = 147)

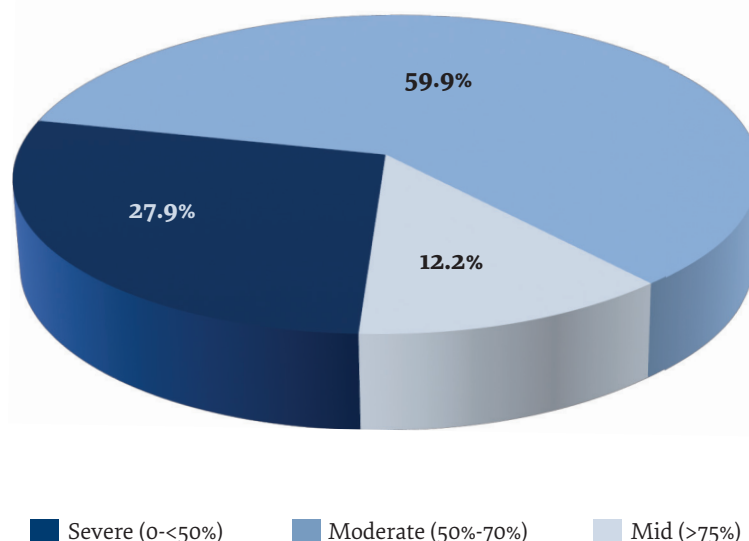


Table 4. Association between the severity of neglect and risk factors (n = 147)

Child data	Severity of neglect		χ^2	P
	Severe (0–50% n= 41)	Mild/Moderate (50–75%; n = 106)		
Age (years)	N (%)	N (%)		
1 month–1year	2 (4.9)	9 (8.5)	3.40	^{MC} P = 0.31
1–5	23 (56.1)	60(56.6)		
6–12	6 (14.6)	6 (5.7)		
Gender			3.44	0.06
Male	24 (58.5)	44 (41.5)		
Female	17 (41.5)	62 (58.5)		
Residence			20.7 *	P < 0.001*
Rural	25 (61.0)	23 (21.7)		
Urban	16 (39.0)	83 (78.3)		
Unexplained injury			1.31	0.25
No	32 (78.0)	91 (85.8)		
Yes	9 (22.0)	15 (14.2)		
ICU admission			4.46*	0.035*
No	28 (68.3)	89 (84.0)		
Yes	13 (31.7)	17 (16.0)		
Outcome			0.69	^{MC} P = 0.79
Complete recovery	30 (73.2)	75 (70.8)		
Incomplete recovery with complication	11 (26.8)	28 (26.4)		
Death	0 (0)	3 (2.8)		
Circumstances of poisoning			4.82	^{MC} P = 0.25
Accidental	31 (75.5)	72 (67.9)		
Abuse	0 (0)	2 (1.9)		
Suicidal	8 (19.5)	31 (29.2)		
Incorrect medical dose	1 (2.4)	1 (0.9)		
Addict with overdose	1 (2.4)	0 (0)		
Caregiver education level			25.73 *	< 0.001 *
High	3 (7.3)	23 (21.7)		
Moderate	9 (22.0)	56 (52.8)		
Low	29 (70.7)	27 (25.5)		
Caregiver marital status			0.51	^{FE} P = 0.56
Married	38 (92.7)	94 (88.7)		
Single/Divorced/Widowed	3 (7.3)	12 (11.3)		
Caregiver substance abuse			3.68*	0.05*
No	34 (82.9)	71 (67.0)		
Yes	7 (17.1)	35 (33.0)		
Child witnessed violence against caregiver from a domestic partner or other adult			2.24	0.13
No	13 (31.7)	48 (45.3)		
Yes	28 (68.3)	58 (54.7)		
Child witnessed or experienced their caregiver attempting suicide			0.71	0.39
No	35 (85.4)	84 (79.2)		
Yes	6 (14.6)	22 (20.8)		
Working mother			24.82*	< 0.001*
No	39 (95.1)	54 (50.9)		
Yes	2 (4.9)	52 (49.1)		

 χ^2 = Chi square test

MC = Monte Carlo

FE = Fisher Exact Test

P = P value for comparison between the studied categories

* = Statistically significant at P ≤ 0.05

Our study found that female children outnumbered males, contrasting with other studies where more male children were found to be neglected (26-28). This discrepancy may have been influenced by cultural factors where males receive better care due to their perceived future roles as financial caregivers of the family. There was a higher incidence of suicide attempts among female children than male children, in line with findings suggesting varying emotional responses to neglect or abuse between males and females in our setting (29).

While a majority of cases in our study lived in urban areas, likely because Alexandria Poison Centre is located in an urban setting, we found that severe neglect cases were more prevalent among rural dwellers, possibly due to socioeconomic factors and larger family sizes. Although 54 (36.7%) children received education, which we hypothesised would reduce accidental poisoning, 39 (72.2%) educated children attempted suicide and 4 (0.07%) were involved in drug abuse, suggesting that education may have inadvertently facilitated increased access to information about poisons rather than children from their use (31).

We found pesticides and household products to be the most common poisons in Egypt (31) and India, where household products were easily encountered by children exploring their home environment (32). The high suicide rates observed in our sample are supported by reports from the World Health Organization and Food and Agriculture Organization indicating that pesticides are commonly used for suicide in low- and middle-income countries (33).

Neglect signs were evident, with a significant delay in seeking medical advice in 63.3% of cases and unexplained injuries in 16.3%. Similar observations were made in the Eastern Islamic Republic of Iran's intensive care units (34). The average hospital stay was 1.89 days, shorter than the 4.66 days reported in other research (34), likely because over 70% of our cases either improved without complications or refused continued treatment, with loss to follow-up. Complications affected 26.5% of children, with a 2% mortality rate, less than other findings (28,31), where acute poisoning fatalities were 9.9% and 12.5%, respectively.

On admission, nearly half of the children exhibited abnormal behaviours such as aggression, hyperactivity, or unusual fear; signs listed by the National Institute of Health and Care Excellence for child abuse (25). Low caregiver education levels significantly impacted neglect severity, with 28.6% of children having caregivers with drug abuse issues. Lack of supervision was noted in 83% of cases, and almost all children were exposed to dangerous substances. Previous research identified environmental, psychosocial, family-related and individual risk factors linked to unintentional poisoning (35).

Our suicide statistics indicate that 26.5% of admitted children had attempted suicide, with 19% having

witnessed caregiver suicide attempts, aligning with regional suicide rates (36). Neglecting a child's physical appearance was strongly linked to severe neglect, with 24.5% exhibiting poor nutrition and hygiene, matching previous findings of potential or actual injury due to neglect (37).

Additionally, 38.1% of children had frequent home accidents and over half were left unsupervised at young ages, with most child poisonings occurring in the home (30). According to WHO, lack of access to basic necessities is one common form of neglect (36).

To highlight the magnitude of child neglect and guide appropriate action, we developed a neglect severity score for use in poisoned cases admitted to poisoning centres. About one-third of hospitalised children were identified as suffering from severe neglect. Beyond physical injuries, neglect can stunt brain development and lead to psychological issues and engagement with high-risk behaviours, such as substance abuse (38). Evidence suggests that neglected adolescents are more likely to engage in criminal behaviour (39).

Limitations and future research direction

This study has several limitations, including the small sample size, short duration which limits the generalizability and trend analysis and the use of simple statistical tests without controlling for confounding variables. Future research on child neglect in poison centres could benefit from larger sample size with longer duration than our simple 3-month study in one poison unit in Egypt. There is potential for researchers to conduct in-depth case analyses of individual poisoning cases, conduct longitudinal studies to understand long-term outcomes, evaluate training programmes for professionals and conduct comparative analyses across regions to provide a roadmap for improving existing intervention strategies. Future research should prioritize the development and validation of structured assessment tools that can accurately identify and categorize cases of child neglect during admission for acute illness or injury due to poisoning.

Conclusion

Given that the primary causes of childhood unintentional poisoning are inadequate supervision and hazardous environments, the consequences for each child can vary significantly and are influenced by multiple factors. This paper highlights the urgent need to enhance and implement hospital-based community outreach services not only for medical treatment but also to provide tools for assessing child neglect and mitigating its acute short-term and traumatic long-term impacts.

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