Niger J Paediatr 2020; 47 (1):1 – 5

ORIGINAL

Oba-Daini OO
Ogunlesi TA
Adekanmbi AF
Akodu SO

Childhood poisoning in Sagamu, Southwest, Nigeria

DOI:http://dx.doi.org/10.4314/njp.v47i1.1

Accepted: 27th December 2019

Ogunlesi TA (✉)
Oba-Daini OO, Adekanmbi AF
Akodu SO
Department of Paediatrics,
Olabisi Onabanjo University
Teaching Hospital
Sagamu Ogun State, Nigeria.
Email: togunlesi.52@gmail.com,
tunuade_ogunlesi@yahoo.co.uk

Abstract*: Background:* Childhood poisoning is an important cause of childhood morbidity and mortality, especially in children below five years of age. There is an increase in the range of household poisoning agents, particularly cheap hydrocarbon domestic fuel such as kerosene (paraffin).
Objective: To describe the epidemiology of poisoning in the paediatric age group in a tertiary facility in Southwest Nigeria.
Materials and Methods: This was a retrospective study covering the period from January 2013 to December 2018 at the Olabisi Onabanjo University Teaching Hospital, Sagamu Ogun State, Nigeria. Relevant data were extracted from patient's records for analysis.
Results: Out of the 2,881 admissions into the Children's Emergency Room during the study period, 40 (1.4%) reported on account of poisoning but only the records of 31 were available for analysis. The male to female ratio was 2.1:1.The median age was 7.8 years. The case fatality rate was 3.2%. Kerosene was the leading agent of poisoning(17; 54.8%) and palm oil was the most frequently administered home remedy. Dyspnea was the most common presenting symptom. Only one death (3.2%) was recorded.
Conclusion: Poisoning is a problem of young children and it frequently occurs in the home setting. Therefore, efforts should be targeted at educating caregivers about the dangers of poisoning in young children.

Keywords: Children, Epidemiology, Hydrocarbon, Poisoning, Social class.

Introduction

Poisoning in the paediatric age group is a significant and preventable cause of hospital admission, morbidity and mortality in the developing world.[1] Poisoning is defined as the exposure of an individual to a substance that can cause symptoms and signs of organ dysfunction leading to injury or death.[2] Self – accidental ingestion of poisoning agents is the most common mode of poisoning in the paediatric age group in Nigeria[3-5] Common poisoning agents include kerosene, organophosphates, pesticides/ herbicides, "drugs", caustic soda, hypochlorite, carbon monoxide, and alcohol-based herbal concoctions.
Increasing range of household substances which are poisonous coupled with socioeconomic pressure which takes parents out of their homes leaving the children poorly supervised, predispose children to poisoning, especially with their inquisitive nature.
The susceptibility of children to poisoning is due to their smaller size and immature physiology (understandably because toxicity of poisoning agents are related to dose per kilogram).[1]
In 2004, acute poisoning accounted for 45,000 deaths among children and youth below 20 years worldwide.[1] The uniqueness of children with inherent desire to explore their surroundings with their senses especially the sense of taste makes them vulnerable to poisoning when not supervised. In our centre, no study has been done on childhood poisoning hence this study. However, in a recent review of childhood mortality at the same facility, poisoning was reported as one of the less prominent causes of childhood mortality between infancy and five years.[6]
The objective of this study was to describe the epidemiological pattern of childhood poisoning in Olabisi Onabanjo University Teaching Hospital, (OOUTH) Sagamu, Nigeria.

Materials and Methods

This retrospective study was conducted in Olabisi Onabanjo University Teaching Hospital, Sagamu in Sagamu

Local Government Area of Ogun State, Nigeria. The hospital is a state government-owned tertiary and referral health facility. Referrals are received from the public and private health facilities within the state and the adjoining towns in neighbouring states of Lagos, Ondo, and Edo.

New patients are initially seen and triaged at the Paediatric Out-patient Department (POPD) while emergency cases are seen at the adjoining Children's Emergency Room (CHER) building.

The emergency room and outpatient department have nursing staff (some specialized in paediatrics nursing) running three shifts and physicians comprising supervising Consultants, resident doctors, and house officers. The Children Emergency Room runs a 24 hours service.

All the children with poisoning admitted into CHER from January 2013 to December 2018,were recruited. The case records were retrieved from the hospital's Health Information Management Department. The data extracted included the demographics, types of poisoning agents, home interventions, clinical features, family socioeconomic class, and outcome. The socio-economic classes of the children were determined using the model recommended by Ogunlesi.[7] Information from the case records were entered into a pre-designed questionnaire.

Ethical consideration: The retrospective study was conducted in agreement with the Helsinki Declaration on human research.

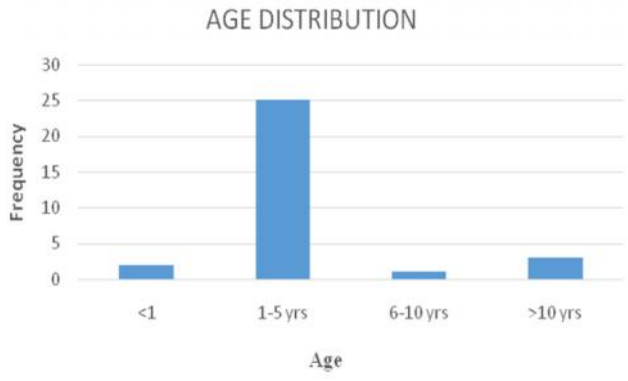
The data were analyzed with IBM SPSS software version 20 using descriptive statistics.

Results

During the study period, a total of 2,881 children were admitted into the CHER, out of which 40 (1.4%)had poisoning. but the records of only 31 children were available for analysis.

Out of the study population, 21 (67.7%) were males and 10(32.3%) were females. The age ranged from 7 months to 14 years with the median age of 7.8years. Most of the children (25;87.1%) were within the age range 1-5 years: (Fig 1).

Fig 1: Age distribution of the study population



Only 77.4% (24/31) of the children had enough information in the records for the determination of socio-economic status. Out of the 24 children,15 (62.5%) belonged to the class IV, 3 (12.5%) to class V while only 4 (16.7%) belonged to class I. There was 1 (4.2%) child in each of social classes II and III.

The majority of the children, 30 (96.8%) had accidental poisoning. The only case of incidental poisoning was of a 13-year old female who deliberately ingested battery powder. The home setting was the place of poisoning in 25(80.6%) of cases while the living room was the setting where the poison was kept in 19.4% (6/31) of cases. There was no information on the places of storage of the poisoning agent in 41.9% (13/31) cases. (Table 1).

Table 1: Frequency of poison circumstances and places of poisoning

Poisoning Circumstances	Frequency	Percentage
Accidental	30	96.8
Intentional	1	3.2
Place of Poisoning		
Home	25	80.6
Bakery	2	6.5
Shop	2	6.5
Religious camp	1	3.2
Toilet	1	3.2
Place of storage of poisons		
Living room	6	19.4%
Kitchen	4	12.9%
Bakery/Shop	4	12.9%
Bedroom	2	6.5
Religious camp	1	3.2
Drug Box	1	3.2
No information	13	41.9

Polyethylene Terephthalate (PET) bottle was used to store the poisoning agent in15 (48.4%) of the cases and next to this was product containers in 7 (22.6%) cases while household containers, such as cup, was used to store the poisoning agent in 3 (9.7%) cases of poisoning. Kerosene was the commonest poisoning agent in 17 (54.8%)cases, followed by hypochlorite and pesticides (9.7%) as shown in Table 2. There was no case of mixed or multiple poisoning.

The majority of the children (28;90.3%) had the poison agent self-administered. Palm oil with or without milk was most commonly administered as the home remedy in 22 (71.0%) children. (Table 3).

The commonest symptom among the children with poisoning was dyspnea, occurring in 14 (45.2%) children out of which 12/14 (85.7%) ingested kerosene. Other frequent symptoms included vomiting and fever recorded in 7 (22.6%) children. Table 4 depicts the other symptoms found in children with poisoning.

The duration of symptoms before presentation at CHER was less than 4 hours in close to half of the patients with 19.4% presenting within 60 minutes of the onset of symptoms of poisoning. A quarter (8) of the children presented after 24 hours of poisoning as shown in Table 3.

Nearly half of the children (14; 45.2%) spent 1 to 3 days on admission while 8(25.8%) and 7(22.6%) children were hospitalized for 4 to 6 and 7to 9 days respectively. Twenty- seven (87.1%) children recovered fully and were discharged home while 3(9.7%) were discharged against medical advice by the caregivers. Only one death was recorded representing 3.2% case fatality.

Table 2: Types of poison containers, types of poison agent and administration

Characteristics	Frequency	Percentage
Poison containers		
Polyethylene Terephthalate bottle (PET)	15	48.4
Product Container	7	22.6
Household Container (Cup)	3	9.7
Others: generator, old/used batteries	3	9.7
No information	3	9.7
Types of Poison		
Kerosene	17	54.8
Hypochlorite	3	9.7
Pesticide	3	9.7
Soda	2	6.5
Carbon Monoxide fume	2	6.5
Alcohol	1	2.2
Used battery powder	1	2.2
Unknown tablet	1	2.2
Harpic (Toilet bowl cleaner)	1	2.2
Poison administration		
Self	28	90.3
Inhalational	2	6.5
Older Sibling	1	2.2

Table 3: Types of home remedies and duration of symptoms

	Frequency	Percentage
Home remedies		
Palm Oil	19	61.3
None	7	22.6
Palm Oil + Milk	3	9.7
Honey	1	3.2
Prayer Water	1	3.2
Duration of symptoms (Hours)		
< 1	6	19.4
1-4	9	29.0
5-9	2	6.5
10-14	3	9.7
15-19	1	3.2
20-24	2	6.5
> 24	8	25.8

Table 4: Poisoning agents and frequency of symptoms

Symptoms	Poisoning agents							Total
	Kero sene	Hypochl--orite	Pesti-cide	Soda	Carbon Monoxide	Alcohol	Har-pic©	
Dyspnea	12		1	1				14
Vomiting	4	1	1	1				7
Fever	6		1					7
Cough	5							5
LOC*					2	1	1	4
Abdominal Pain	3							3
Drooling				1			1	2

*Loss of consciousness

** Other symptoms occurred once: Seizure with pesticide, Restlessness, Oral Sores & Irritability with Hypochlorite and Dystonic reactions with an unknown tablet

Discussion

In this study, 1.4% of all CHER admission during the study period were due to childhood poisoning. This percentage is similar to the findings reported in Ekiti 3 (1.54%) and Ilorin8 (1.0%) respectively. However,, this finding is higher than figures reported in older studies done in Ife (0.52%)9,North-Central Nigeria (0.74%)11 Maiduguri Sudano –Sahelian region of Northern Nigeria (0.54%), Calabar (0.2%) 12, and newly published report from Umuahia (0.6%)13 and in Azare North-Eastern Nigeria (0.64%).4 However, the prevalence in the present study is higher than the reported 0.5% and 0.8% in India 14 and Kenya 15 respectively.

Majority (87.1%) of the children in the present study were less than five years in agreement with the findings reported by Olatunya et al in Ekiti, Fagbule in Ilorin, Adejuyigbe in Ile-Ife, Edelu et al in Enugu, Ugwu et al in Warri, Lang in Kenya, Ansong et al in Ghana, and Annu et al in India. The reason for this observation may be due to the explorative activities of pre-school aged children.

The male preponderance among the studied population may be explained by the difference in socialization between males and females.[1] This observation is similar to findings in Azare,9 Umuahia,13 Warri,21 Ekiti,3 Ilorin7 and Ile-Ife10 whereas female preponderance was reported by Shwe et alin Jos while equal distribution by sex was reported in Ghana.[16] Majority of the children with determined social class belonged to low-income category and this is consistent with the findings in other studies conducted in other parts of the country.[3, 8, 19, 21] This may be due to poor housing,spacing, overcrowding and lack of information, associated with low socioeconomic status.

The majority of the incidents of poisoning were accidental, occurred at home in the living room and were self-administered,[3] probably due to the storage of potential poisoning agents in familiar and attractive containers, with easy to remove caps. This boosts the adventurous and explorative nature of young children especially when they are poorly supervised or unsupervised. [1, 16] Poisoning agents were mostly stored in PET bottles which are both familiar and attractive to children in about half of the studied population, similar to the find-

ings of Olatunya et al.[3]
This presents a veritable setting for poisoning. Therefore, it is not surprising that kerosene was the major poisoning agent in about half (54.8%) of the children in this study, similar to the observations in other parts of the country [3,10,12,13,19] and Ghana.[16] Kerosene is a major source of household fuel used for cooking and lighting in most homes especially in the lower socioeconomic classes.[17] Kerosene looks like water and it is commonly stored in PET bottles. Vendors and traders also store kerosene in the same manner, making ingestion possible once children have access to it. This hydrocarbon has a highly volatile vapour, which when ingested diffuses into the respiratory tract of children leading to inflammatory responses.[18] Therefore, the preponderance of dyspnea as a presenting complaint at presentation is not surprising and in consonance with the findings in other studies.[3,13,19]

The addition of blue dye to kerosene has dramatically reduced the incidence of kerosene poisoning.[22] The use of tamper-proof containers in households may greatly reduce the incidence of kerosene poisoning. In our setting, affordability and availability of such containers will be a community intervention of immense benefit in childhood kerosene poisoning.[23] Also, community education programmes aimed at raising awareness of the dangers of kerosene ingestion and advice on safe storage (using the print, electronic and social media) will go a long way in reducing the incidence of kerosene poisoning.[24]
Palm oil with or without milk was the commonest home remedy administered to children with poisoning before presentation in the hospital. This practice is premised on the false belief that it is a general antidote to poisons. Sometimes, the children are force-fed with palm oil or milk leading to aspiration and respiratory diseases. [3,8,10,13,19]

The only mortality recorded in the present study (3.8% case fatality rate) was due to carbon monoxide poisoning. This is unlike the Maiduguri study which reported no mortality8 but similar to findings in Jos,11 Ekiti3 and Enugu.19 The mortality rate reported from India (2.5%) is lower than what was observed in the present study. Carbon monoxide is an odourless and colourless gas, largely from incomplete combustion of fuel in household electricity generating sets; the latter have become essential in most households due to inadequate and unstable power supply in the country.[20] The practice of keeping portable electricity generating sets indoor to prevent theft exposes family members to inhalation of carbon monoxide fumes. These fumes destroy surfactant in the lungs with a resultant ventilation-perfusion mismatch, hypoxia, and cerebral edema, leading to death. Public education on the dangers inherent in running electricity generating sets indoors and advocacy for steady power supply will greatly reduce the incidence of carbon monoxide poisoning.
Early presentation to the hospital with low risk of mortality may be explained by the easy accessibility of the health facility based on its location coupled with prompt diagnosis and treatment.
Limitations to this study include incomplete documentation of data as well as the inability to conduct toxicologic studies and relate serum levels of poisoning agents to the severity of clinical features. These are important for appropriate therapeutic planning.

Conclusion

Poisoning is a major cause of childhood morbidity in Sagamu, Nigeria. Parents and caregivers need to have health education on the dangers posed by the inappropriate vehicle of poison storage, placement, and harmful home remedy practices. The need for supervision of children's explorative activities, especially those aged less than five years, at home.
More national and regional data may be needed to have a centrally/regionally driven policy and health education programmes targeted at childhood poisoning.

Authors Contributions
OOO and OTA Conceived, designed the study and analysed data. All were involved in drafting, review and editing of the manuscript
Conflict of interest: None
Funding: None

Acknowledgment

The authors are grateful to the staff of the Health Information Management Department of Olabisi Onabanjo University Teaching Hospital Sagamu for support with data collection.

References

1. World Health Organization. World report on child injury prevention. http://www.who.int/violence_injury_prevention/child/injury/world_report/poisoning_english (Accessed 16th April 2019).
2. Osterhoudt K, Shannon M, Henretig F. Toxicological emergencies. In: Fleisher G, Ludwig S, eds. Textbook of Pediatric Emergency Medicine. 4th ed. Philadelphia: Lippincott William & Wilkins. 2000:887-897.
3. Olatunya OS, Isinkaye AO, Ogundare EO, Oluwayemi IO, Akinola FJ. Childhood Poisoning at a Tertiary Hospital in South West Nigeria. *J Nepal Paediatr Soc 2015;35 (2):103-110.*

4. Iragbogie AI, Dalhat SA, Maurice E, Ibrahim I, Anas A. Acute Childhood Poisoning in Azare, North Eastern Nigeria. *J Adv Med Med Res 2018; 26(3): 1-8; Article no. JAMMR.41050.*
5. Dominic OO, Godwin S. Accidental Childhood Poisoning in Benin City: Still a problem? *J Biomed Sci 2013; 12(2) :19-26.*
6. Fetuga MB, Ogunlesi TA, Adekanmbi AF, Olanrewaju DM, Olowu AO Comparative analyses of childhood deaths in Sagamu, Nigeria: implications for the fourth MDG. *South Afr J Child Health 2007;1(3):103-111.*
7. Ogunlesi TA, Dedeke IOF, Kuponiyi OT. Socio-Economic classification of Children attending Specialist Paediatric Centres in Ogun State, Nigeria. *Niger Med Pract 2008; 54 (1) :21-25.*
8. Fagbule D, Ojuawo A. Accidental Childhood poisoning in Ilorin, Nigeria. *Niger J Paediatr. 1986; 13(1): 21-22.*
9. Oguche S, Bukbuk DN, Watila IM. Pattern of Childhood Poisoning in Sudano- Sahelian North-Eastern Nigeria. *Niger J Clin Pract 2007; 10(2):111-115.*
10. Adejuyigbe EA, Onayade AA, Senbanjo IO, Oseni SBA. Childhood Poisoning at the Obafemi AwolowoUniversity Teaching Hospital, Ile – Ife, Nigeria. *Niger J Med 2002;11 (4):183-186.*
11. Shwe DD, Toma B, Pate SI, Adedeji I, Oguche S. Profi le of Hospital Admissions of childhood poisoning at a North – Central Nigerian Tertiary Health care Centre. *Jos J Med 2013; 7(2):5-11.*
12. Ochigbo SO, Udoh JJ, Antia – Obong OE. Accidental Childhood poisoning in Calabar at the turn of the 20th Century. *Niger J Paediatr 2004; 31 (3):67-70.*
13. Ibeneme CA, Ogbonna IF, Nwala GC. Accidental Poisoning among Under-Five Children seen at the Childrens Emergency Room of Federal Medical Centre Umuahia, Nigeria. *Int J Med Health Dev 2018; 23(1):201-205.*
14. Annu J, Sivanandam S, John M. Poisoning in Children from an Educationally and Economically Advanced Urban Area of South India. *Asian J Epidemiol2012 ;5(4): 13-129.*
15. Lang T, Thuo N, Akech S. Accidental poisoning in Kenyan Children. *Trop Med Int Health 2008; 13(6): 845-847.*
16. Ansong D, Nkyi C, Appiah CO, Amuzu EX, Frimpong CA, Nyanor I, Nguah SB, Sylverken J. Epidemiology of pediatric poisoning reporting to a tertiary hospital in Ghana. *South Afri J Child Health 2016;10 (1):68-70.*
17. Ozoh OB, Okwor TJ, Adetona O, Akinkugbe AO, Amadi CE, Esezobor C, Adeyeye OO, Ojo O, Nwude VN, Mortimer K. Cooking Fuels in Lagos, Nigeria: Factors Associated with Household Choice of Kerosene or Liquefied Petroleum Gas (LPG). *Int J Environ Res Public Health 2018; 15 (4): 641.*
18. O' Donnell KA, Ewald MB. Poisoning In: Kliegman RM, Staanton BF, ST. Geme JW, Schor NF, Behrman RE eds. Nelson Textbooks of Paediatrics 21st edition, Elsevier publisher USA. 2020 :250- 274.
19. Edelu BO, Odetunde OI, Eke CB, Uwaezuoke NA, Oguonu T. Accidental Childhood Poisoning in Enugu, South-East, Nigeria. *Ann Med Health Sci Res. 2016;6(3) :168-171.*
20. Iribhogbe PE, Erah FO. Carbon Monoxide Poisoning in Nigeria – It is time to pay attention. *Port Harcourt Med J 2009 ;4(1): 88-89.*
21. Ugwu GIM, Okperi BO, Ugwu EN, Okolugbo NE. Childhood Poisoning in Warri, Niger delta, Nigeria: A ten year retrospective study. *Afr J Prm Health Care Fam Med 2012: 4 (1), Art. #321*
22. Fagbule DO, Joiner KT. Kerosene poisoning in childhood: a 6-year prospective study at the University of Ilorin Teaching Hospital. *West Afr J Med 1992;11:116–121*
23. Pearn J, Nixon J, Ansford A, Corcoran A Accidental poisoning in childhood: five year urban population study with 15 year analysis of fatality. *Brit Med J 1984; 288 :44–46.*
24. Donald PR, Bezuidenhout CJ , Cameron NA An educational campaign in the Cape Town area to prevent paraffin poisoning. *South Afr Med J 1991;79: 281–282.*