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PATTERN OF HOSPITAL ADMISSIONS OF CHILDREN WITH POISONING IN THE SUDANO-SAHELIAN NORTH EASTERN NIGERIA

***S. Oguche, ** D. N. Bukbuk, *** I. M. Watila**

, Department of Paediatrics, University of Maiduguri Teaching Hospital, Maiduguri **Chief Scientific Officer, Data Analyst, WHO National Polio Laboratory, * Department of Paediatrics, State Specialist Hospital, Maiduguri*

ABSTRACT

Objective: Poisoning is a major problem in the paediatric population. In view of the paucity of literature on the subject matter in the northeastern part of Nigeria, this retrospective study was undertaken to describe the epidemiological features of accidental poisoning in children less than 13 years old who were admitted to the Emergency Paediatrics Unit (EPU) of the University of Maiduguri Teaching Hospital (UMTH), Maiduguri. The specific objectives included the determination of the age range most vulnerable, the principal agents of poisoning, the annual pattern of occurrence, the commonly administered home remedy and the examination of the need for preventive strategies in this part of the country.

Patients and Methods: Data were extracted from the medical records of 113 patients with accidental poisoning during the period January 1984 to December 2003.

Results: One hundred and thirteen (0.74 %) out of 15,196 children were admitted for accidental poisoning. Their ages ranged from 6 months to 12 years. Children aged 0 to 2 years accounted for 80 (70 %) cases. There were 69 males and 44 females with a male: female ratio of 1.6:1. Fifty-nine (98.3 %) out of 60 children were from low social background. Kerosene and food poisoning (*Manihot esculenta*) accounted for 89 (78.8 %) and 19 (16.8 %) of all cases of poisoning respectively. Respiratory symptoms dominated the clinical presentation in 71 (62.8 %) cases. Seven patients had severely low bicarbonate levels. Home remedies were administered to 50 (44.3 %) out of 113 patients. These remedies consisted of milk in 49 (92.5 %) and palm oil (oil from *Elais guineensis*) in 17 (32.1 %) cases. The mean duration of hospital stay was 0.66 (1.67) days. Severe neurological sequelae was recorded in one patient. There was no death. The highest frequency of admission was recorded during the hot and dry months of March to June.

Conclusion: Kerosene is the commonest cause of childhood poisoning in Northeastern Nigeria and children aged 0 to 2 years are the most vulnerable age group. The highest frequency of admission coincides with the period of the hot and dry months of March to June. Education and improvement in the standards of living of the people are the key challenges for the regional governments of Northeastern Nigeria towards achieving poison control.

Key Words: Pattern, admissions, Poisoning, children, Northeastern Nigeria. *(Accepted 17 July 2006)*

INTRODUCTION

Childhood poisoning is an important public health concern in Nigeria [1-4] as it is in most parts of the world. [6-9] While all ages are represented, the types of poisoning vary from one geographical region to the other and the major determinants of the variety of poisons include socio-economic status[6] of the parents of affected children and the environment [10,11] in which they live. Poisoning in children often results from accidental ingestion of toxic substances, intentional (suicidal), forced (homicidal) or from undetermined reasons.[1,12]

Correspondence: Dr S Oguche

The categories of ingested poisoning agents include drugs (pharmaceuticals), kerosene (paraffin), agricultural agents (pesticides, plants and mushrooms) and household products (bleach).[7,13] Generally, poisoning in childhood has an incidence which may be as high as 2 percent of all hospital admissions.[8] The vulnerability of young children under 5 years may account for up to 80 percent of all cases of poisonings.[2] The mortality rate attributable to poisoning varies depending on the age of the victim and the type of poison ingested. While acute childhood poisonings from industrialized nations of the world and the southern part of Nigeria have been extensively studied, there is paucity of literature on

childhood poisoning in societies of Northeastern Nigeria which have different patterns of daily life, customs, products and beliefs. This study was conducted to address this lack of data. The present study reviews the profile of hospital admissions with respect to prevalence demography,the offending products, and therapies in this tertiary institution and compared findings with those of other parts of the country and the rest of the world. The need for a poison control center in the region is stressed.

PATIENTS AND METHODS

The University of Maiduguri Teaching Hospital (UMTH) was commissioned in 1983 but measurable clinical work began in 1984. The hospital serves as the referral center to Northeastern region made up of six states besides proximity to neighboring Republics of Cameroon, Niger and Chad. We performed a retrospective review of the charts of all patients less than 13 years old admitted into the Emergency Paediatrics Unit (EPU) of the University of Maiduguri teaching Hospital (UMTH), Maiduguri, Nigeria for accidental poisoning between 1984 and 2003. Data extracted from the patients' case notes included demographic characteristics, offending agents ingested, presenting symptoms and signs on admission, nature of remedy given at home before seeking hospital intervention, hospital therapeutic measures applied, total duration of stay in the hospital, and the outcome of management. The home addresses of the patients were recorded. The uptake of routine immunization was scrutinized to determine the peoples' utilization of basic hospital services.

Statistics

Data generated was entered into computer software EPI Info 6.4d (Dean et al 1994) and subsequently analyzed using SPSS version 11.0. Descriptive data is presented in tables and charts.

RESULTS

Over the period of 19 years 15,196 children were admitted into the Emergency Paediatrics Unit (EPU). Out of these, 113 (0.74%) children were managed for accidental poisoning. The ages of the children ranged between 6 months and 12 years with a mean of 1.7 (1.4) years. Children aged 0-2 years constituted the bulk of the admissions, accounting for 80 (70%) of the cases. Poisoning cases declined sharply after the age of 2.5 years (Figure 1). There were 69 males and 44 females giving a male: female ratio of 1.6:1. Figure 1 shows the age and sex distribution. Although more males than females were involved, the difference did not reach statistical significance ($p = 0.690$).

The social background of the children was determined in 60 out of the 113 cases. Of these, 59 (98.3%) cases were from high-density slums of Maiduguri while 1 (1.7%) case was from a low-density government reservation area. The review of the types of poisoning agents is shown in Table 1 with kerosene as the commonest source of poisoning and pharmaceutical products as the least common.

Table 1. **Types of Poisoning Agents**

Type of poisoning	Number of patients	Percentage
Kerosene	89	78.8
Plants(M. Esculenta,Cow pea)	19	16.8
Organophosphates	13	2.7
Pharmaceutical agents	1	0.9

The clinical presentation on admission is shown in Figure 2. Respiratory symptoms and signs including cough, dyspnoea, intercostals recessions and crepitations were the most dominant clinical features. Vomiting and diarrhoea were observed in 71 (62.8%) and 32 (28.3%) cases respectively. Twenty-one (18.6%) of the 113 children had abnormal chest radiographs, which shows varying degrees of scattered patchy opacities consistent with pneumonitis. All the patients with abnormal chest radiographs had kerosene poisoning.

Parents attempted to treat children at home with various remedies in 53 (46.9 %) out of 113 poisoned children before hospital admission. Some of the home interventions included induction of vomiting 10 by stimulation of posterior pharyngeal wall (18.9 %) cases, administration of palm oil (oil from *Elais guineensis*)17 (32.1 %) cases, milk was offered in 49 (92.5 %) cases, while 2 (3.8 %) of the children had traditional herbal mixtures. The nature of herbal remedies could not be determined.

Soon after instituting home treatment, the children were rushed to the hospital. Ninety-nine (87.6 %) had treatment in the hospital. of these, two (1.8 %) children had gastric lavage, 93(82.3 %) had antibiotics. The classes of antibiotics given included penicillin in combination with an amino-glycoside (gentamicin) in 60 children, co-trimoxazole in 21 children and macrolides given to 2 cases.

Other treatment administered included steroid therapy in 49 (43.4 %) patients, intravenous infusion in 68 (60.2 %) patients and oral rehydration solution for 8 (7.1 %) patients. Sodium bicarbonate was added to infusion in 19 (16.8 %)patients and in 3 (2.7 %) patients antacid was given. Only in 11 (9.7 %) cases was oxygen therapy was instituted. The duration of hospital stay was short ranging from over night

detention to 7 days (Mean, 0.66 [1.67] days). Patient management outcome was assessed and 111 (98.2 %) children survived intact. One (0.9 %) child out of the three children who had organophosphorous poisoning survived with neurological sequelae (motor deficits) while in one child taken away from the hospital against medical advice by parents outcome could not be assessed. No death was recorded.

The monthly frequency of admission was analyzed to see if there is a definite pattern and the result of this is shown in Figure 3. It appeared that the admission rate on account of poisoning rose during the hot and dry months of March to June but fell during the rainy season from July to October.

Figure 1 Age and Sex Distribution

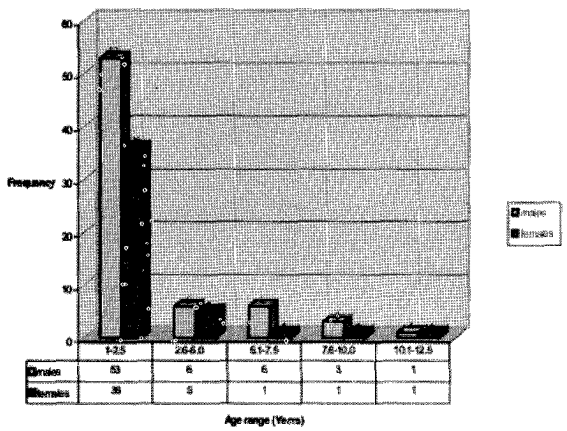


Figure 2 Frequency of clinical features on admission in children after ingestion of poison

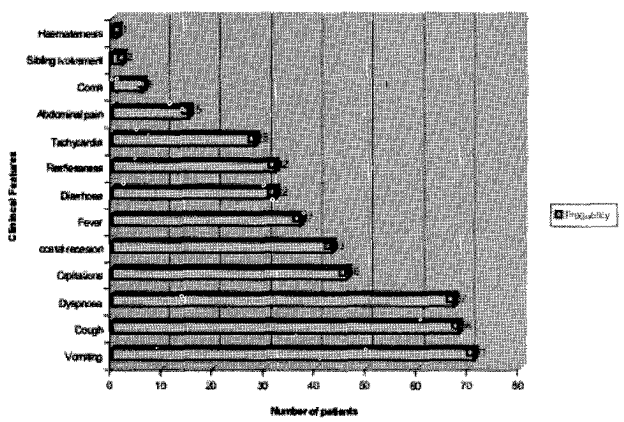
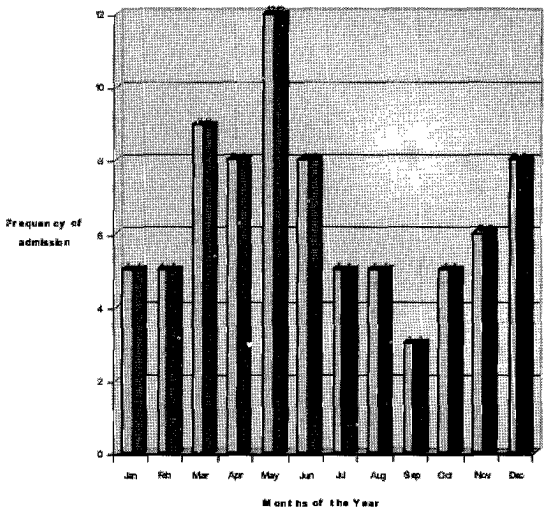


Figure 3 Monthly frequency of hospital admission of children in to EPU on account of poisoning



DISCUSSION

We found a prevalence of 0.74 % of the admissions to be due to accidental poisoning which compares favorably with 0.52% and 1% reported from centers in southern and north central parts of Nigeria.[2,5] These however, vary from the experience of other centers in the developing countries such as Antigua and Barbunda, India and Malaysia where prevalence of 1.3%, 2% and 2.1% were reported.[6,7,8]

The most common cause of poisoning in our study was kerosene accounting for 78.8 % of cases. This compares with findings from Ilorin and Zaria in northern Nigeria with rates of 51% and 68% respectively.[5] Lower figures were reported from the southern Nigerian towns of Ilesha, Lagos, and Nnewi with rates of 14%, 19.8%, and 20% respectively.[1,10,11] The reason for the disparity in these rates of admissions on account of kerosene poisoning between the northern and southern parts of Nigeria is not clear but kerosene is a major fossil fuel for heating, cooking and lighting in the semi-arid northern parts of Nigeria as opposed to the situation in the southern states where there is abundance of other sources of fuel. Differences in standard of living have been demonstrated to influence the pattern of substances ingested by children as in Antigua and Barbuda[6] where it was observed that as the economic level rose, there was a shift in the substances ingested with hydrocarbon and plant poisoning decreasing while chemical and medication ingestion increased. This may partly explain the predominant kerosene ingestion found in the northern parts of the country when viewed against the background of a more socio-economically developed southern Nigeria. Kerosene ordinarily appears like

water and is often stored in recycled beverage bottles used also for storage of water and placing it within the reach of children is occasioned in many homes where the household is constrained by poverty to live in overcrowded single rooms. Besides, ignorance and negligence, the banes of poor societies, are highly associated with accidental childhood poisoning.[2,6] Children are likely to come in contact with potentially poisonous products when they are left alone or are not closely monitored. Children living within a disrupted family structure, or having disturbed care giver-child relationship, or children of parents hooked on drugs or alcohol abusers are particularly at risk of poisoning.

Most of the patients in whom the social background was observed came from the high-density slums. It would appear that kerosene poisoning in particular occurs more commonly in the poorer countries of the world with lower standards of living. Reports from India,[8] Ghana,[14] Northern Jordan,[15] Sri Lanka,[16] Nigeria,[1-5] South Africa,[17] the Caribbean,[6] and Malaysia[7] all indicate high incidence of hydrocarbon/kerosene poisoning. On the contrary, improved standards of living has changed the pattern and complexity of childhood poisoning in the affluent and industrialized nations of the world where reports reflect poisoning due to other agents such carbon monoxide,[9] drugs and household products.

Plant poisoning was a common cause of hospital admission accounting for 16.8% cases in this study and the most offending agent was *Manihot esculenta* eaten as unprocessed meals. As an agricultural settlement, *Manihot esculenta* is cultivated along lakes Alau in Maiduguri and Chad and is consumed by residents sometimes uncooked. Usually, admissions include more than a member of the household sharing in the cassava meals. Presentation was often within hours of the *Manihot esculenta* meal ingestion. Lack of adequate processing before consumption is common and harmful in the case of some species of *Manihot esculenta*. *Manihot esculenta* is rich in cyanide and extensive processing is often required before it is deemed fit for human consumption.

Poisoning due to self-medications and traditional remedies were not frequently encountered in our review of patient hospital records. This is a major departure from the experience of other authors reporting from southern Nigeria and elsewhere.[2,5,7] The highest prevalence of acute poisoning occurred within 0-2 years age bracket accounting for 70% of all ages considered, a finding, which agrees with reports [2,5,17] from Nigeria and elsewhere. Toddlers and exploration are almost inseparable and the end result of this child-environment interaction most often is childhood accident, which form of may take the form of poisoning. The study demonstrates a male preponderance in accidental poisoning over the females even though this difference is not significant. Other workers have shown that male more than female children are more vulnerable.[2,5] They postulate that male children are more adventurous and have greater propensity to become victims than the female children.

Admission rates were higher in the months of March to June. This finding may likely be related to environmental condition. Maiduguri is hottest (with temperatures obtained from the Nigeria Meteorological Agency, Federal ministry of Aviation Weather Station, Maiduguri International Airport varying between 30- 45°C) during these months and the daily fluid requirement is expected to be highest at this period of the year. Since children when thirsty tend to drink any fluid in familiar containers placed within their reach, it is not surprising that many more cases of poisoning occurred during this period of the year.

Home treatment resorted to by most parents before seeking hospital attention included milk and palm oil (oil from *Elais guineensis*) given orally. It is believed that these substances would ameliorate the consequences of poisoning in children and their use is widespread in Nigeria irrespective of geographic location.[1-5] Occasionally when vomited and aspirated, milk and palm oil worsen the child's condition.

While some workers have reported a mortality rate of up to 11.9% following accidental poisoning,[18] no deaths were recorded in our series. Majority of our patients had kerosene poisoning. Mortality from kerosene poisoning in various reports[2,5,15] appear to be very low or rare possibly because large quantities of the hydrocarbon is usually not consumed before a child begins to cough and choke; symptoms which frighten most parents and make them to seek early medical attention. The more lethal chemical compounds such as drugs, caustic soda and traditional mixtures described by other authors who reported higher mortality rates[2, 16, 18] were not found in the present study.

We conclude that kerosene poisoning was the commonest cause of childhood poisoning in northeastern Nigeria, there is a significant seasonal variation in hospital admissions due to childhood accidental poisoning and children aged 0-2 years are the most vulnerable to accidental poisoning in this geographical region. Education and improvement of the standards of living are cardinal ways of preventing childhood accidental poisoning in northeastern Nigeria. These functions are best served by a poison control center, a challenge for the regional governments to tackle.

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