

# Epidemiological and Clinical Aspects of Acute Intoxications in Children Between 1 Month and 15 Years in the Paediatric Emergency of the UHC Gabriel Toure

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**Abstract:** *Introduction:* Defined by the WHO as all the pathological manifestations following ingestion of food or the administration of products or drugs behaving like a poison in the body, acute intoxication is a growing problem. serious in pediatrics, in developing countries because of their frequency and the difficulties of care. In Mali, poisoning in children is very poorly assessed, in part due to the lack of popularization of poison control and pharmacovigilance centers. The objective of our study is to study the epidemiological and clinical aspects of acute poisoning in children in the emergency department of the pediatric department of the Gabriel Touré University Hospital. *Material and methods:* We carried out a retrospective, cross-sectional and descriptive study from January 2016 to December 2018, or a period of 3 years. It concerned children from 1 month to 15 years old hospitalized in the pediatric emergency room of the Gabriel Touré University Hospital for proven acute poisoning. The data were collected by: a pre-established individual survey form, information contained in the medical files of patients after the approval of the Head of the Department. *Results:* During our study period, 80 children were hospitalized for acute poisoning out of a total of 5,437, a frequency of 1.47%. The sex ratio was 1.3. The 13-48-month age group accounted for 65% of cases. The patients themselves were responsible for their poisoning in 74.2% of cases. Poisoning by unspecified drugs accounted for 25% of cases. The oral route represented 92.4% of the poisoning routes. Ingestion of milk (29.9%) and oil (6.3%) were the most common actions for parents. Vomiting with 35% and respiratory distress with 35% were the most frequent manifestations. The mean hospital stay was 3.5 days (50%). In 50% of cases, death occurred within the first 24 hours. *Conclusion:* Poisoning remains a common occurrence in our department, mainly linked to several medicines and household products.

**Keywords:** Epidemiology, Clinical, Intoxication, Child, 1 Month - 5 Years, Mali

## 1. Introduction

Children are naturally curious and want to explore their homes and surroundings. These places can present dangers to the child, including the risk of accidental poisoning [1].

Defined by the WHO as all the pathological manifestations following the ingestion of food or the administration of products or drugs that behave like a poison in the body [2], acute poisoning is an increasingly serious problem in paediatrics, in developing countries due to their frequency and

the difficulties of management [3]. The polymorphism of clinical signs makes it difficult to make an accurate etiological diagnosis if the substance ingested is unknown or unclear [4]. The severity of the intoxication depends on the toxicity of the product in question, the mode of penetration, the dose absorbed, the physiology and the age of the subject [5]. Thus, the time between exposure to the poison and the onset of clinical symptoms is of crucial importance in terms of the possibility of intervention. The longer it takes to intervene, the lower the chances of survival [1]. The worldwide incidence of poisoning is not known [6]. It can be assumed that half a million people die each year from various poisonings, including those caused by natural toxins, including 45,000 children or young people under 20 years of age from acute poisonings [1, 6]. The majority of fatal poisonings occur in developing countries [7]. Although health programmes are making a huge effort to reduce the morbidity and mortality associated with infectious diseases, very few programmes are directed towards reducing the morbidity and mortality associated with violent deaths in children, such as those related to road traffic accidents and poisoning [8]. Serious intoxication in children requires treatment in specialised treatment centers or intensive care units because of the potentially lethal quantity of the substance absorbed and/or the clinical manifestations [6]. In Mali, poisoning in children is very poorly evaluated, partly due to the lack of popularisation of anti-poison and pharmacovigilance centers, as shown by the lack of publications in this field. The anti-poison and pharmacovigilance center of Morocco (APCM) had collated 77133 cases of intoxication between 1980 and 2007 with a lethality of 15.34% [5]. Although children's intoxications are often accidental, these accidents are linked to sociological and economic specificities: parents are often unaware, not storing their medicines or products, or frequently decanting toxic products into containers or bottles for food use (bleach, acids, pesticides, insecticides) [8]. In addition to the classic accident, parents can poison their children by making treatment errors or by inflicting dangerous traditional therapies. In the treatment of drug poisoning, stomach pumping has been replaced by activated charcoal due to the availability of many carbo-adsorbable products [8]. As we do not have a toxicology center at the Gabriel Touré University Hospital, we initiated this work to better understand the extent of accidental acute intoxications.

## 2. Methodology

### 2.1. Study Setting and Location

Our study took place in the emergency department of the paediatrics department of the Gabriel Touré University Hospital in Bamako. Located in the center of the city of Bamako, the Gabriel Touré University Hospital is a national reference hospital (3rd level of the health pyramid in Mali). It houses several departments, including the paediatrics department, which is composed of a neonatology service to which the INREU (Intensive Nutritional Recovery and

Education Unit) is attached, a general paediatrics service and a paediatric emergency service. The paediatric emergency department was created in 2010 as part of the department's restructuring. It comprises a reception hall which is also a sorting room, two consultation rooms, a hospitalization sector with 20 cots and 6 beds with two rooms for infants and one room for older children.

### 2.2. Type of Study and Inclusion Criteria

This was a retrospective, cross-sectional and descriptive study from January 2016 to December 2018, or a period of 3 years. It concerned all infants and children aged between 1 month and 15 years hospitalised in the paediatric emergency department of the Gabriel Touré University Hospital for proven acute intoxication. The data was collected from a pre-established individual survey form and the information contained in the patients' medical files. The variables studied included epidemiological, clinical, therapeutic and outcome data. Data entry and analysis were carried out using Microsoft Word and Excel 2016 and SPSS 20 software. Informed consent was obtained from the Head of Department and confidentiality of data was guaranteed. We were confronted with certain difficulties given the retrospective nature of the study, including the following: some necessary or even essential complementary examinations were not carried out or not recorded in the files, the lack of clear information on the type of products ingested/time of administration, and the lack of follow-up of patients after their discharge.

## 3. Result

In our study, we were able to collect 80 patients meeting our inclusion criteria, representing 1.47% of all paediatric emergency room admissions during the same period. The sex ratio was 1.3. The age group 13-48 months was the most affected (65%) with a mean age of 39.5 months and extremes of 1 month and 168 months. The majority of patients were cared for by their mothers, who were mainly housewives (76.3%). The patients themselves were responsible for their intoxication in 74.2% of cases. The products involved were mainly medicines, followed by industrial products. However, intoxication by unspecified drugs represented 25% of cases. The routes of intoxication were mainly oral (92.4%). The ingestion of milk in 29.9% of patients and oil in 6.3% were attitudes frequently adopted by the parents. The most frequent clinical signs were digestive disorders (vomiting: 35%, diarrhoea: 8.7%) and respiratory disorders (respiratory distress: 35%). Management was essentially symptomatic with an average hospital stay of 3.5 days (50%). However, the case fatality rate remained high (17.5%) and 50% of these deaths occurred within the first 24 hours after admission to hospital.

## 4. Discussion

Over a period of 3 years, we were able to collect 80 patient files meeting our inclusion criteria out of 5437

hospitalizations during the same period, or a frequency of 1.47%. Our frequency is higher than those reported by Sylla M and coll [2] in 2006 in the same department (1.08%) and by Tidiane D and coll [9] at the SO-University Hospital in Lomé (0.25%), but similar to that of Kouéta F and coll [10] in 2009 in Burkina Faso (1.4%). Children aged 13-48 months represented 65% of our sample, as in the Kouéta F and coll study [10], where children aged one to four years (60%) were in the majority. The same trend is confirmed in the study by Ines Maaloul and coll [11] who reported that children aged between 1 and 4 years were the most affected with 59%. According to Diallo T and coll [12], walking babies with 18.4% were the most affected after adults in a study of intoxications at all ages. These results can be explained by the fact that at this age children are too playful and often escape their parents' supervision. Boys, with 56.2%, were the most numerous in our study, or a sex ratio of 1.3. This male predominance was reported by Sylla M and coll [2] in 2006 (61.8%), Kouéta F and coll [10] in 2009 (54.5%), Tidiane D and coll [9] in 2020 (57.2%) and Ramzi K and coll [13] in 2020 (sex ratio: 1.32) without any of these studies providing a clear explanation for this finding. In 90% of cases, children were looked after by their own mothers, by the grandmother in 3.8% of cases or by the household help (3.8%). These mothers were housewives in 76.3% of the cases and did not attend school in 61.3% of the cases. According to Sylla M and coll [2], 75.3% of the women were responsible for their children and 71.9% were housewives.

**Table 1.** Distribution of patients according to socio-economic data.

Socio-economic data	Workforce	Percentage
Age range of patients (in months)		
1-12	14	17.5
13-48	52	65
49-180	14	17.5
Gender of patients		
Male	45	56.2
Female	35	43.8
Educational level of mothers		
Educated	31	38.7
Not in school	49	61.3
Mothers' occupation		
Housewives/ homemakers	61	76.3
Civil servants	9	11.2
Students	4	5
Tradeswomen	6	7.5
Care mode of patients at the time of the accident		
Grandmother	3	3.7
Mother	72	90
Household helper	3	3.7
Child's sister	1	1.3
Neighbour	1	1.3

The products frequently cited in the intoxication were drugs (42.7%), 25% of which were unspecified, followed by industrial products (32.6%) and domestic products (17.5%). Our result on the drug-related cause is lower than that reported by Ramzi K and coll [13] (69%) and higher than those of Sylla M and coll [2] and Cremer R and coll [14] who found respectively 41.6% and 18.2% of cases related to the absorption of drugs. However, domestic products were

incriminated by Sylla M and coll [2] in 33.7% and by Kouéta F and coll [10] in 44.7%. Similarly, industrial and household products (34.33%) were the most incriminated, followed by medicines (22.29%) in the study by Tidiane D and coll [9]. On the other hand, food, with 49.4% of cases, came in first place in the study by T Diallo and coll [15], followed by medicines (25%) and oil (9.7%). The predominance of medicines in our study could be explained on the one hand by the illiteracy of parents who often self-medicate without knowledge of dosage or indications, and on the other hand by the availability of medicines to children. Jae Hyug W and coll [16] in their study on poisons in children and adolescents reported that household products, medicines and induced care come first. Furthermore, out of one hundred and five cases of poisoning, caustics (33 cases), followed by drugs (28 cases) and then hydrocarbons (16 cases) represented the main toxic agents found in the study by Ines M and coll [11].

**Table 2.** Distribution of patients by type of drug.

Type of toxic substances	Workforce	Percentage
Carbon monoxide	2	2.5
Plant	4	5
Unspecified drugs	20	25
Specified drugs		
Aspirin	4	5
Xylocaine	3	3.7
Paracetamol codeine	2	2.5
Paracetamol anti histamine	1	1.3
Iron folic acid	1	1.3
Permanganate	1	1.3
Morphine	1	1.3
Methyl dopa	1	1.3
Household products		
Bleach	2	2.5
Caustic soda	11	13.7
Petroleum	1	1.3
Industrial products		
Corrosive products	9	11.2
Organophosphates	12	15
Petrol	4	5
Oil gas	1	1.3
Total	80	100

The patients themselves (59 out of 80) were responsible for their intoxication in our study and the route of administration frequently found was oral (92.4%). Ines M and coll [11] reported that the victim was directly responsible for the accident in 80% of cases. The first actions taken by the parents at the time of the accident were the administration of milk (29.9%) and oil (6.3%). In the study by Sylla M and coll [2], the first actions were administration of milk (33.4%) and induced vomiting. During a CAP survey on acute accidental poisoning of children in Yopougon, MH Aké-Assi and coll [17] reported that the substances most used as antidotes were palm oil, palm oil and palm oil, were palm oil (48.5%), milk (27.1%), antidotal plants (6%), elephant stool (4%), honey, water, fresh egg and ice-cold beer (3%), lemon juice and orange juice (1.4%). The main reason for using these

substances is to make the victim vomit. However, these attitudes can be detrimental in some cases of poisoning such as caustic soda and bleach. Clinically, digestive (35%) and respiratory (35%) manifestations predominated, followed by neurological manifestations including coma (18.7%). As in our study, hepato-digestive disorders (44.75%) and nervous system disorders (25.84%) predominated in the study by Diallo T and coll [12], followed by respiratory manifestations (8.28). On the other hand, Doumbia M Z [18] in 2006 reported 30.02% of digestive disorders and 8.20% of respiratory disorders. But neurological disorders in his study (41.68%) were higher than in ours.

**Table 3.** Distribution of patients by clinical data.

Clinical data	Workforce	Percentage
Person responsible for the accident		
Child himself	59	74.2
Mother	15	18.2
Health worker	3	3.8
Grandmother	3	3.8
Routes of administration of the toxic substance		
Oral	74	92.4
Inhalation	2	2.5
Percutaneous	1	1.3
Venous route	3	3.8
First actions taken		
Ingestion of milk	24	29.9
Ingestion of oil	5	6.3
No action taken	44	55
Ingestion of water	4	5
Ingestion of plant decoction	3	3.8
Clinical signs		
Neurological manifestations		
Agitation	13	16.2
Coma	15	18.7
Digestive manifestations		
Vomiting	28	35
Diarrhea	7	8.7
Respiratory manifestations		
Respiratory distress	28	35

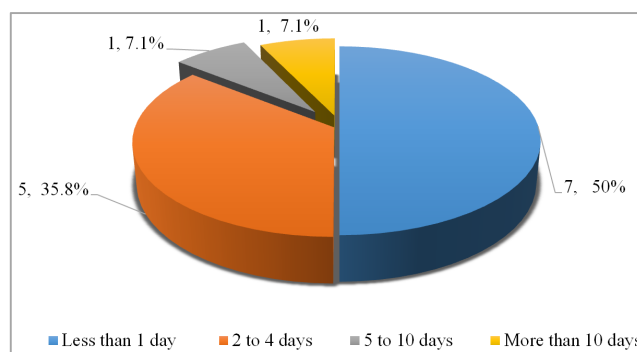
The treatment was mainly symptomatic depending on the nature of the causative product. Thus, gastric dressing was used in 20% of patients, anti-convulsants (16.2%) and analgesia (37.5%). Contrary to a widespread opinion, antidotes are far from representing the essential treatment of acute intoxications. Generally speaking, they are only useful if the effects of the toxic substance are reversible, and therefore essentially in the case of intoxications seen at an early stage. Their use should not in any case give an illusory impression of safety dispensing with symptomatic management. In our study, the antidote was used in only 10% of cases, and antibiotics in 37.5%, in addition to other procedures depending on the toxicant. In Ramzi K and coll [13], symptomatic management was performed in 74% of cases. Gastric lavage was performed in 32.5% of patients and antidote was used in 9.23% of cases. The duration of hospitalization in our series was 1 to 4 days in 50% of cases, as in the study by KR Cessouma and coll [19] who reported an average hospitalization time of 3 days. However, 26.2% of patients stayed less than 24 hours. The evolution was marked by a cure in 77.5% of cases, a result

much lower than that of Kouéta F and coll [10] who found a cure rate of 97%.

**Table 4.** Distribution of patients according to therapeutic data.

Therapeutic data	Workforce	Percentage
Infusion of fluids	76	95
Antidote	10	12.5
Antibiotic	30	37.5
Anticonvulsant	13	16.2
Gastric dressing	16	20
Analgesic	30	37.5
Length of stay in hospital		
<24 hours	21	26.2
1-4 days	40	50
5-10 days	14	17.5
>10 days	5	6.3
Fate		
Healing	62	77.5
Escape	4	5
Death	14	17.5

Our mortality rate was 17.5% which is higher than those of T Diallo and coll [14], Kouéta F and coll [10] and Sylla M and coll [2] who reported respectively 2.5%; 3.4% and 13.7%.



**Figure 1.** Distribution of deaths by length of hospitalization (number of days between the start of hospitalisation and death),  $n=14$ .

## 5. Conclusion

Poisoning is a common accident in our context, occurring frequently in infants between 13 and 48 months of age, with the majority of cases caused by them. It is essentially linked to medicines and domestic products. However, its management remains delicate in our context, with a very high death rate.

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