



Diarrhea of Bacterial and Parasitic Origin in Children in the Pediatric Department of the ANAIM Hospital in Kamsar Guinea

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Abstract

Introduction: Diarrhea is one of the leading causes of illness and death in children under 5 years of age in developing countries. The etiologies are varied and depend on the living conditions. The aim of our study was to describe the causative germs by performing stool culture and examination of stool, in order to help set up a targeted intervention and provide an early warning for more effective response measures.

Method: This was a prospective cross-sectional study of descriptive type, conducted over a 12-month period from January 1 to December 31, 2018 in the pediatric department of ANAIM Hospital in Kamsar. We included all children hospitalized for acute diarrhea and who had undergone coproculture and stool parasitology before any treatment.

Results: Out of a total of 1223 admissions, 293 cases of acute diarrhea were hospitalized in the pediatric ward of Kamsar, the average age was 22±8 months, the associated pathologies were malaria (86.60%), severe acute malnutrition (11.95%), acute otitis (9.55%). The bacteria found were *E. coli* (1.71%), *Klebsiella* (1.02%), *Salmonella* (0.34%), *shygella* (0.34%) and *listeria monocytogene* (0.34%). The intestinal parasites found were amoebae (3.75%), giardia (3.75%), roundworms (0.34%) and trichomonas (0.34%).

Conclusion: Diarrhea is an important cause of morbidity in children in the pediatric department of the hospital of Kamsar. The germs found were dominated by *E. coli*, *Klebsiella*, amoebae and giardia.

Keywords: Diarrhea; Child; Kamsar; Parasitology; Coproculture

Introduction

Diarrhea in children is a major problem and a major threat to public health, it is considered the second leading cause of infant mortality in the world [1,2]. Nearly 1.7 billion cases occur each year, half of them in Africa and South Asia. It kills approximately 525,000 children under the age of five every year [1,2]. It accounts for 40.0% of global under-five mortality [3,4]. Bacterial pathogens contribute enormously to the disease, being responsible for 38.0% of deaths from childhood diarrhea [3]. Developing countries bear the heaviest burden, causing 10.0% of deaths in Nigeria, India

and Pakistan [3,4]. Studies have reported that *Escherichia coli* is the most common bacterial pathogen associated with infectious diarrhea in children, with a prevalence of 41.4% documented in southeastern Nigeria [3]. Some bacterial organisms involved, whose prevalence varies by region, include several species such as *Salmonella*, *Shigella* and others [2,4]. In Guinea, the prevalence of diarrhea was estimated at 15% in children under 5 [5]. About one in two children had diarrhea in the last 2 weeks and parents sought treatment or advice from health workers [5]. Several strategies have been developed and implemented to reduce the mortality

and morbidity of diarrhea in children, namely the use of ORS, zinc supplementation [1,2]. Diarrhea is one of the main causes of consultation and hospitalization in the Pediatrics department of the ANAIM hospital in Kamsar. What are the germs responsible for diarrhea in this health structure. This is the question that guided this study, the objective of which was to identify pathogenic germs by carrying out stool culture and stool parasitology. At the end of this study, targeted interventions could be considered to help provide an early warning for more effective response measures.

Methods

This was a descriptive cross-sectional study, over a period of 12 months from January 1 to December 31, 2018 at the pediatric department of the ANAIM hospital in Kamsar located 300 km from the capital Conakry, in the administrative region of Boke. This study concerned a population of children aged from 1 month to 206 months admitted to the pediatric department of the ANAIM hospital in Kamsar during the study period. We included all children aged 1 month to 206 months with acute diarrhea (emission of more than 3 liquid stools per 24 hours, lasting less than 14 days) hospitalized in the department and having undergone a stool culture and parasitology. stools before any treatment. We conducted an exhaustive recruitment of all diarrheal children hospitalized in the pediatric department in whom stool culture and fresh stool parasitology were performed before any treatment. For data collection, we interviewed the parents, a clinical examination of each patient, stool samples in a sterile pot for macroscopic examination (appearance of liquid, mucous, bloody stools.) and direct microscopic examination in search of parasites (*ascaris*, *trichomonas*, *giardias*, *candida*, *amoebas*, and after staining with gram in search of bacteria then culture to search for germs (*E. coli*, *shigella*, *Salmonella*, *Klebsiella*...). The variables were qualitative and quantitative grouped into sociodemographic, clinical and biological data. Registers, hospital records, children's health records and a data collection sheet were used as tools. The data collected were entered and analyzed with Epi Info 2000 version 3.5.4 software. The study being descriptive, we did not use comparison tests, while we calculated statistical tests of frequency, averages and extreme values. The study took place after the approval of ANAIM hospital officials, the data collected was anonymized.

Results

Sociodemographic characteristics

Out of a total of 1225 patients admitted during the study period, 293 suffered from acute diarrhea, i.e. a hospital frequency of (23.92%); the age group 12 - 36 months was the most represented 118 (40.75%), the average age was 22.8 months with extremes of 1 month to 206 months. More than half of the 163 children (55.6%), were boys. The majority, 263 (89.7%) resided in downtown Kamsar. The majority of mothers were aged 25 and over 199 (67%), housewives 175 (61%) and uneducated 225 (76.79%).

Variables	Number N = 293	Percentage
Age :		
1-11 months	118	40.27
12-36 months	137	46.75
37-59 months	10	3.43
60 monts and more	28	9.55
Sex :		
Male	163	55.63
Female	130	44.37
Residence :		
Kamsar city	263	89.76
Kamsar city	30	10.24
Mother education		
Educated	68	23.21
No educated	225	76.79
Parent occupation:		
Household	175	61.09
Tradeswoman	103	35.15
Civil servant	11	3.75
Age of mother :		
15-18 years old	9	3.08
19-24 years old	85	29.01
25 years old and more	199	67.91

Table 1: Sociodemographic characteristics.

Clinical features

The aspect of the stools was mainly watery (86.01%) on the other hand the bloody stools represented only (1.37%), nearly

two children out of 5 had a frequency of stools per 24 hours equal to 5. Associated pathologies to diarrhea were mainly malaria 201 (86.60%), acute malnutrition 35 (11.95%), acute otitis media 28 (9.55%), urinary tract infections 13 (4.44%), bacterial meningitis 7 (2.4%), HIV 12 (4.09%) [Figure 1]. The assessment of the degree of dehydration according to WHO criteria showed severe dehydration in 17% of cases, moderate form 40% and mild form in 43% of cases.

amoebas 11 (3.75%), trichomonas 8 (2.73%), pinworms 1 (0.34%) and roundworm 1 (0.34%). The antibiogram was performed for each bacterial strain: *Klebsiella* was sensitive to ceftriaxone and gentamycin; *E. coli* was sensitive to ceftriaxone and cotrimoxazole. *Shigella*, *Salmonella*, and listeria monocytogene were susceptible to cefotaxime.

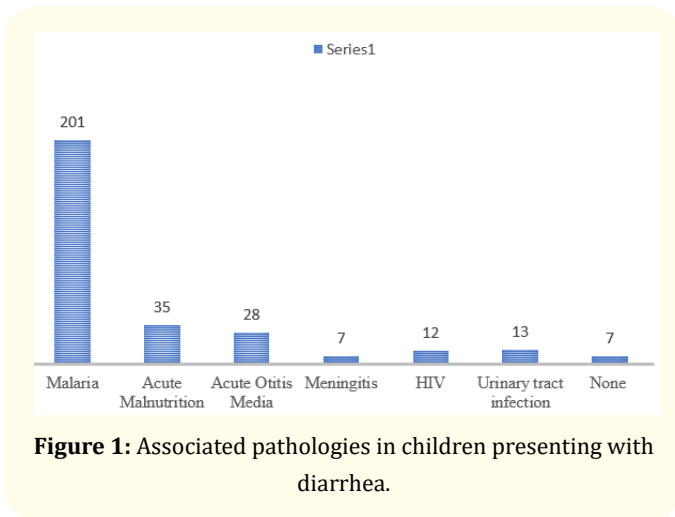


Figure 1: Associated pathologies in children presenting with diarrhea.

Saddles	Number N = 293	Percentage
Aspect		
Aqueous	252	86.01
Bloodstained Glairo	3	1.02
bloody	4	1.37
Mucous	34	11.60
Frequency		
4 times	95	32.42
5 times	113	38.57
6 times	42	14.33
More than 6 times	43	14.68

Table 2: Characteristics of saddles.

Biological characteristics: Coproculture, Stool parasitology

The following germs were identified by stool culture: *Candida albicans* 11 (3.75%) was the most frequent pathogen followed by *E. coli* 5 (1.71%); of *Klebsiella* 3 (1.02%); *listeria monocytogene* 1 (0.34%) and *Salmonella* 1 (0.34%). Stool parasitology was dominated by *candida* 15 (5.12%), *Giardia* 11 (3.75%) and

Variables	Number N = 293	Percentage
Coproculture		
Négative	271	92.50
<i>Candida</i>	11	3.75
<i>E. coli</i>	5	1.71
<i>Klebsiella</i>	3	1.02
<i>Listeria monocytogene</i>	1	0.34
<i>Salmonella</i>	1	0.34
<i>Shigella</i>	1	0.34
Stool parasitology		
Négative	246	84.00
Amibes	11	3.75
Ascaris	1	0.34
<i>Candida</i>	15	5.12
<i>Giardia</i>	11	3.75
Oxyures	1	0.34
<i>Trichomonas</i>	8	2.73

Table 3: Characteristics of coproculture and stool parasitology biological examinations.

Discussion

This study aimed to identify the pathogens responsible for diarrhea in children, in order to help implement a targeted intervention and provide an early warning for more effective response measures. During this study, the hospital frequency of diarrhea was 23.91%. Children under 5 years old were the most affected, more than half were male (55.63%). Our results are significantly higher than those reported in EDS 2018 [5]. This difference could be explained by the fact that our study was carried out in the hospital where all sick children are hospitalized without the disc. The 2018 DHS reported the results of the household study. The same results were found in the DRC [6], in Senegal [7], respectively 38.5% and 80%. The child at this age is particularly exposed to diarrhea for two main reasons, it is during this period

that the child's own immunity gradually develops, while there is a drop in antibodies to maternal origin. The infant is then more vulnerable to infections during this period. It is also at this time that the food diversification of the child begins. When this is poorly conducted, diarrhea and then malnutrition can occur [7]. Pathologies associated with diarrhea were dominated by malaria, acute malnutrition and acute otitis media respectively 68.60%; 11.94% and 9.55%. Several factors contribute to the frequency and severity of diarrhea in the tropics: difficulties in accessing drinking water; the high prevalence of pathogens in the environment, co-infections, HIV/AIDS infection; intricacy with protein-energy malnutrition and vitamin deficiency; association with sickle cell disease and schistosomiasis [8].

The majority of patients came from downtown Kamsar (89.76%), this would be explained not only by the proximity of the hospital, but also because downtown Kamsar has a large population that does not is not served by drinking water. The predominance of the housekeeping profession (61.09%) and mothers aged over 25 corroborates with that reported in Mali where the majority of mothers were housewives aged 20-29 years [9]. The uneducated mothers (76.79%) in our study was similar to that of Douchi. M., *et al.* in Niamey who found a frequency of (43.54%) uneducated mothers; the same results were found in Diakité FLF, *et al.* in Mali [9]. The bacteriological examination of the stools is done by inoculating the stools on appropriate culture media [1]. The aim is to search among a very abundant commensal flora either for bacteria that are usually absent and known for their pathogenic power, or for an abnormally predominant bacterial species. Bacterial diarrhea in children occurs in small epidemics within the family or in the community. It is therefore useful to perform a stool culture in the event of significant febrile syndrome, diarrhea, or poor clinical tolerance, especially in young children [15]. Our study reveals for nine out of 10 no bacterial cause had been highlighted and that one out of 10 cases of diarrhea was caused by *Candida albicans*. The similar result was documented by S. Dossim and Sanou., *et al.* Nazek., *et al.* and finally by I. Diagne, respectively 27% 54%; 13% and 54.76% of cases [10]. *E. coli* is responsible for acute gastroenteritis in developing countries.

The use of the laboratory for the etiological diagnosis of infectious diarrhea is an unusual practice in developing countries, especially since more than 60% of examinations come back

negative and techniques for the detection of different pathogens are not available (*E. coli*, virus) [4]. Intestinal parasitosis represented in our study (16.7%) and bacteria (8%). S. Dossim., *et al.* in Lomé found the same results [6]; on the other hand, Nazek Al., *et al.* in Tunisia had found in their study of case controls that (92%) of children presenting with diarrhea was of bacterial origin [11]; 1.7% was parasitic, while (16.5%) of viral origin [12,13]. Our result was similar to that of S. Diouf., *et al.* at the Dakar University Hospital [17].

Intestinal amebiasis and intestinal candidiasis were present in children less than one-year-old, while giardiasis, trichomoniasis, oxyuriasis and ascariasis were encountered in children over one year of age. According to Ohouya DG., *et al.* in his study on intestinal parasitosis in the ivory coast, children aged 28 to 48 months were the most affected [1]. This age generally corresponds to the period of food diversification. In our study, *E. coli* was the most common, 5 cases (1.71%). We found three cases of *Klebsiella* (1.02%), this rate remains low compared to that reported by I. Diagne., *et al.* which was at (17.95%). *Salmonella*, *shigella* and listeria monocytogene were found at rates of 0.34% of cases in our study. In northern Jordan, Mohammed., *et al.* had found a rate of (4.5%) *Salmonella* [5], while Sanou. I., *et al.* in Burkina Faso had reported (13.5%) *Klebsiella* cases and (26%) *Salmonella* cases [11]. *Salmonella* are responsible for acute gastroenteritis associated with sepsis in resource-limited countries.; infants, newborns and sickle cell and immunocompromised children are at risk. Given the epidemics caused by large human congregations, shigellosis represents a public health phenomenon in developing countries [4]. They are more common in infants and older children than in young children [8]. A large number of cases of *Candida albicans* were found on stool culture and stool parasitology in our study. S. Diouf., *et al.* in Senegal in its study on malnutrition and acute diarrhea declared that the predominance of *Candida albicans* was nuanced by the massive use of antibiotics, which caused disturbances of the intestinal flora [14,15]. We have not documented cases of listeria monocytogene associated with childhood diarrhea in pediatric settings; in the literature, they are responsible for gastroenteritis in the event of a large inoculum [13]. According to the WHO, *E. coli*, *Salmonella*, *shigella*, *Campylobacter jejuni* and *Cryptosporidium* are responsible for bacterial diarrhea in children in developing countries [15].

Conclusion

Diarrhea in children is a reality in the pediatric department of Kamsar hospital, young children are severely affected; the bacteria and parasites incriminated were dominated by *E. coli*, *Klebsiella*, amoeba and giardia; The problem of drinking water shortage in developing countries is a major health challenge. A vicious circle is finally maintained by the underlying pathologies such as malaria, acute malnutrition... and the defective environment where bacteria and parasites abound.

Bibliography

1. Carvajal-Velez L., et al. "Diarrhea management in children under five in sub-Saharan Africa: does the source of care matter A Countdown analysis". *BMC Public Health* 16 (2016): 830.
2. OMS. Maladies diarrhéiques (2017).
3. Afolabi OF, et al. "Serum zinc levels amongst under-five children with acute diarrhoea and bacterial pathogens". *The Nigerian Postgraduate Medical Journal* 25.3 (2018): 131-136.
4. Lanata CF, et al. "Global causes of diarrheal disease mortality in children <5 years of age: a systematic review". *PloS one* 8.9 (2013): e72788.
5. INS. Enquête Démographique et de Santé 2018 Conakry (2018).
6. Sangaji MK, et al. "Epidemiological and clinical study of rotavirus acute diarrhea in infants at the hospital Jason Sendwe Lubumbashi, Democratic Republic of Congo". *The Pan African Medical Journal* 21 (2015): 113.
7. I Diagne BC, et al. "Fall Diarrhées Infantiles En Pratique Hospitalière: L'expérience du Service de pédiatrie du CHU de Dakar". *Médecine d'Afrique Noire* 40.5 (1993).
8. Chisenga CC, et al. "Aetiology of Diarrhoea in Children Under Five in Zambia Detected Using Luminex xTAG Gastrointestinal Pathogen Panel" (2018).
9. Diakité FLF DF, et al. "Facteurs favorisant les maladies diarrhéiqueschez les enfants de 0 à 5 ans encommune ii du district de bamako-mali". *Mali Medical* xxxiv.4 (2019): 8.
10. S Dossim Adms, et al. "Etiologies Des Diarrhees Infectieuses Chez Les Enfants De Moins de cinq Ans (5 Ans) Au Centre Hospitalier Universitaire Sylvanus Olympio Delome DE 2005 à 2009". *Revue Bio-Africa* 13.1 (2014): 32-36.
11. Al-Gallas N, et al. "Etiology of acute diarrhea in children and adults in Tunis, Tunisia, with emphasis on diarrheagenic Escherichia coli: prevalence, phenotyping, and molecular epidemiology". *The American Journal of Tropical Medicine and Hygiene* 77.3 (2007): 571-582.
12. Hien BT, et al. "Diarrheagenic Escherichia coli and Shigella strains isolated from children in a hospital case-control study in Hanoi, Vietnam". *Journal of Clinical Microbiology* 46.3 (2008): 996-1004.
13. Mathew S, et al. "Epidemiological, molecular, and clinical features of rotavirus infections among pediatrics in Qatar". *European Journal of Clinical Microbiology and Infectious Diseases: Official publication of the European Society of Clinical Microbiology* 40.6 (2021): 1177-1190.
14. Omolajaiye SA, et al. "Pathotyping and Antibiotic Resistance Profiling of Escherichia coli Isolates from Children with Acute Diarrhea in Amatole District Municipality of Eastern Cape, South Africa". *BioMed Research International* 2020 (2020): 4250165.
15. Imbert P. "Prise en charge des diarrhées aiguës de l'enfant en milieu tropical". *Medicina Tropical* 61.1 (2001): 226-230.