

**Epidemiological profile and etiological of intestinal disease from the children
in Mauritania. 3 years review and 6 month in Laboratory of Mother and Child Hospital
Center**

SUMMARY:

Introduction: The intestinal infection form an important reason of consultation in the laboratory of the Mother and Child Hospital Center of Nouakchott (CHME).

Objectif : it's about determine the etiological of microbiological exams of stools from children aged 0 to 18 years between August 2015 and February 2019.

Methodological: it's retrospective study based on data register of microbiological saddle examination for the register and informatics system of laboratory in the center hospital mother and child of Nouakchott (CHME).

Result: In total 266 children on 702 presented an intestinal infection were a prevalence of 37,9%. The boys presented a prevalence of 40,1% then the girls have a prevalence of 35,9%. Aged bridge [3-6 years] and [12-17 years] are the most touched with respective prevalence of 53,10% and 52,5%. The infectious etiology is dominated by *Entamoeba coli* with 31,95%, after intestinal *Giardia* with 26,30%, after *Entamoeba histolytica* then gender levure *Candida* 8,27% and *Salmonella spp* with 7,14%.

Conclusion: The intestinal parasitosis are more important from the children at Nouakchott and it is necessary to take them in charge by the sanitaries authority.

Keywords: *Entamoeba histolytica*, *Salmonella spp*, etiology

Introduction

Different micro-organic can cause intestinal infections, it can be parasites, bacteria, virus or fungi. The pathology mechanism is variable could go to gastro-enteritis to an inflammatory of digestive tract and it touches all the digestive tract compartments. The most common symptoms are diarrhea, vomiting and abdominal pain. [1,2]

Bacteria are more often responsible of acute infection but rarely chronic infection [2]. In the developing countries these acute infections are responsible about 1,8 million death per years among the children aged less than 5 years. [3]

Intestinal infections are more often due to poor food hygiene and they touch around 30% of people every year and OMS estimated those intestinal infection to more of 2 million death per years. [4]

Among the contributing factors of intestinal infection, an immunosuppression (SIDA) and especially the children aged [1, 5, 6].

Bacterial infections are often caused by genus species bacteria *Campylobacter*, *Yersinia*, *Salmonella* and *Shigella*. They manifest themselves by acute diarrhea, abdominal pain and fever with loose stools sometimes mucus and or blood. The acute diarrhea are responsible one third of death by dehydration in the developing countries and especially from children. [1, 7]

Intestinal parasitosis affects mainly the children who have poor alimentary hygiene thus contact frequency with the ground, most parasitosis can be asymptomatic with low prevalence (ex. le *Trichocéphalose*) while others cause severe troubles in case of massive infestation such as occlusion due to *ascariidiosis* and amoebic dysentery [8]. The size of these pathogens varies from micrometers to more meters and they are grouped into protozoa and metazoan and the pathology of these parasites depends to their intestinal location [9,10].

The intestinal parasitosis represent 25% to whole infectious diseases in the world [10]. The Mondialorganization of health (OMS) estimated in 2002, 3 to 5 milliard people were infected and 450 million of them have developed a pathology from these infections [9].

In sub-Saharan Africa, particularly the children in school age are affected indisproportionally by geo-helminthiasis infections. OMS estimate more than 270 million of preschool children and more than 600 million educated children live in parasitic high transmission zone. And the number of death per year is estimated to 155 000 cases [9,11].

Amoebiasis due to *Entamoeba histolytica* is the third death cause by parasites disease after the paludism and the schistosomiasis and affect around 180 million people every year, as to giardiasis, it is principal cause of diarrhea and affect around 200 million people in the world [12]. According to OMS the ascaris, ankylostomes, dysenteric amoebas and flagellates would cause per year alone 195 000 deaths in the world [13].

The intestinal parasitosis in Mauritania are poorly documented; we could not find national data that allowed us to know the impact of intestinal parasitosis in the country.

We have done a retrospective analysis of loose stools exams in the laboratory of hospital center Mère et Enfant of Nouakchott with the aim to obtain an etiology profile of intestinal infection from the children.

Methodology

Type of study: we have performed a retrospective study, descriptive and analytical over the period of 3 years and 6 months, going from August 2015 to January 2019.

Framework and population: we have included all children aged of 0 to 17 years examined in laboratory service of child and mother center Centre of Nouakchott over a period going from August 2015 to February 2019 as part of a request exam of microbiology samples.

Data resource and measure:to achieve the objectives of examination,we referred to coprological of examination register of labotoryand digital registerof intranet hospital. For every patient,we transcribed on the registration form, collected the sociodemographic data (age and gender) of intranet and biological data (the appearance of the saddles, the results of microscopic exams and culture) bench register.

Data analysis

Data entry and statical analysisare realized using the software SPSS 20.0. for descriptive study , qualitative variables are reportedbypercent, while quantitative variables are reported on overage withtheir differences types. For analytical study,the comparisons aremade by Chi-deux (χ^2) test for qualitativedata,and by t of Student test for quantitativedata.Significance level are fixed to5%.

Microbiologicalanalysis of samples

sampling

Samples of saddles aretaken insterile transparentjars at laboratory or at patient home then achemined atlaboratory as soon as possible.

Macroscopicexamination ofsampling

The first step is macroscopic examination of saddles by visual observation to definesaddles aspect , we can have several saddles consistency (mold, pasty , diarrheaand liquid) with presence or no blood or mucussells diarrhea saddles and liquid will be cultivateon environmentSS and HK to research pathogenic bacteria .

Direct microscopic examination and after concentration

For doing direct examination, a small representative portion of stool is mixed with a drop of saline solution on a slide, covered with a lamella and observed under microscope at the objective x10 and x40. Direct examination of stool allows to put in evidence the presence of trophozoites living in stool, to do qualitative and quantitative cytology and to put in evidence the presence of yeast. In case of presence of yeast in stool we are going to perform a culture in Sabouraud-Chloramphenicol area.

For enrichment of stool, we used Ritchie's modified method which allows to see and identify easier the cysts and parasite eggs present in stool.

Culture

Diarrhoeal stools and liquid are seeded systematically in SS area and HK area to research the presence of Salmonella or Shigella, in case of the presence of yeast to direct examination and culture on Sabouraud-Chloramphenicol agar done to identify the yeast of genus Candida.

Conflicts of interest

Authors do not declare any conflict of interest

Contribution of authors

All authors participated to the conception and the implementation of the work, they have also read and approved the final version of manuscript.

Results

Results analysis of microbiological stool examination at the level laboratory of center Hospitalier Mère et Enfants of Nouakchott over the period going from 01 August 2015 to 31 January 2019 allowed to enlist 702 children aged from 1 to 17 years (**Table I**). Average age of our people is 9.36 years and the sex ratio of 0.85 in girls' favour (324/378).

The age group more represented is that of [6-11 years] with 63.8% cases (N= 448) followed by those aged of [3-6 years] with 20.6% cases (N=145).

Stool appearance of macroscopical examination showed a predominance of pasty stool with 53.8% cases (N=378) ; followed of mucus stool with 17.1% cases (N=120) and diarrhead stool with 14.8% cases (N=104). (Table II)

The prevalence of intestinal infection for our people is 37.9% (n=266), average to age, the prevalence is higher from the children aged of [3-6 years] with a prevalence of 53.10% followed of those aged [12-17 years] with a prevalence of 52.5% and last position the children aged [1-2 years] with a prevalence of 34.7%.

According to sex, the prevalence of intestinal infection is higher from the boys with 40.1% while for girls it is 35.9%.

According to stool appearance, the prevalence of intestinal infection was higher when the stool are diarrhead with 50.9% followed of pasty stool with 34.4% then mucus stool and liquid stool who had a prevalence of 33.3% and at last position we have mucus stool with a prevalence of 30%. (Table II)

Direct microscopical examination and after enrichment allowed to do in evidence a broad spectrum of parasites, dominated by amoebas with 53% of intestinal infections (N=141), the amoebas species are dominated by *Entamoeba coli* with 31.95% cases (N=85), followed by *Entamoeba histolytica* then *Entamoeba dyspary* with 1.5% cases (N=4). (Figure 1)

After the amoebas come the flagellates who represent 27.8% cases (N=74), they are first dominated by the *Giardia intestinalis* with 26.31% cases (N=70) followed of *Trichomonas intestinalis* with 1.5% cases (N=4). (Figure 1)

We have also observed helminths and sporozoaires, the helminths represent 2.63% cases (N=7) dominated by *Hymenolepis nanus* with 1.87% cases (N=5) and *Ascaris lumbricoides* with 0.75% cases (N=2) and the sporozoaires represent 0.37% cases (N=1) it's about of one case *Isospora belli*. (Figure 1)

The coproculture allowed to identify pathogenic bacteria in 7.9% cases (N=21) it's about basically *Salmonella spp* who represent 7.14% cases (N=19) and *Shigella spp* who represent 0.75% cases (N=2) and yeast who they are genre *Candida* and represent 8.27% cases, dominated by the *Candida albicans* with 4.5% cases (N=12) while the *Candida non albicans* represent 3.75% cases (N=10). (Figure 1)

According to stool appearance, most germs were more frequently found in pasty stool except *Trichomonas intestinalis*, *Salmonella spp* and *Shigella spp* found mostly in diarrheal stool and *Isospora belli* who are found mostly in mucus stool. (Table III)

Discussion

We have done a retrospective study descriptive on 702 samples of children stool aged of 0 to 17 years examined at level of laboratory in Center Hospitalier Mère et Enfant of Nouakchott, over a period 3 years and 6 months, going to 01/08/2015 to 31/01/2019.

The macroscopical examination has been done to determine stool appearance then microscopical examination for highlighting the trophozoite and yeast. And the Ritchie modified method was used for identification of cysts and eggs. The identification of yeast and bacteria was obtained after culture on specific media.

Overall prevalence of intestinal infections for our people is 37.9%, it's close of more studies particularly that reported by Saotou P and al at Cameroun with 35.38% (14), to that reported by Sylla K and al in Senegal who got 35% (15) and that reported by Menan EIH and al at Côte d'Ivoire with 36.64% (16)

Our prevalence is superior to that found by Baba O.A.Sand al from school children of Guidimakha region , Barakna and Gorgol in (Mauritania) who is 33,4 % (16). But also by several others studies particularly by that Guamri Y.E and al at Marocco who got a prevalence of 16.38%(18)from the children aged less than 18 years ,that Diouf JB and al in Senegal who got 27.5% (10)from the malnourished children ,that N. Belhamri and R. Mouta who got 24% to Marrakech(Maroc)(19)from the children aged of 3month to 16 years ,by Soumana Aand al at Niger who got 33% (20)from children less than five years and in Tunisiaor Emma Sand al obtained a prevalenceof 12,5% (21).

The result of our studyis inferior to the prevalence found by Cissé M and al in Burkina Faso with 54,7%(22), by Diouf JB and al in Senegalwith 45,5 %.(23), by Tegen D and al and by Araya G.Wand alin Ethiopiawho got respectively 62,3%(11)and 58%(24),by G. Tékpaaand alin Centre Afriquewith 88,23%(12), by Yaro A.S and al in Mali with 46.5 %(9) from the person aged of 1-21 years , by Dancesco P.and al in Côte d'Ivoire with 84.8%(25)and by Benouis A. and al in Algeria (26) who reporteda prevalence of 19,9% in Oran ??? to check because inferior toour Prevalence.

The prevalence of intestinalinfection isvery variable dependingon the diagnostic methods , the study people and the study period .

According to age , the age group[3 to 6] years is most touchedwitha rate of 53,10% followed that [12 to 17] years with 52.5% and age group [1 to 2] years is less touched with 34.7%.Our results are close of that reportedAraya G.W and al (24)in Ethiopiawith a prevalencehigher from the children aged of 4 to 5 years , that Dancesco P and al in Côte d'Ivoirewith a prevalencehigher in age group [7 to 10] years and [11 to 15] years (25)and that of Sarmila T. and al in Nepalwho got a prevalencehigher in age group [6 to 10] years and [11 to 15]years (27).The weak prevalencefrom the children aged of less 2 years can explain by

the fact that it is all above to leave then the children start to play and to eat àoutside afterthe weaning .

Others studies on the others hand relate prevalencehigher from the children aged overof 10 years such as Diouf JB and al in Senegal (10) with 36.8% and Ould Abdallah M and al during a masse survey in Mauritaniain 2010 (28)

While in other study ,the prevalenceis most important from the children aged of 1 to 5 years particularly the one of Diouf JBN and al in Senegalwith a prevalenceof 70%(23), Tékp Gand al with 42.14%(12), Soumana Aand althe children agedof 1 to 24 mois are the most touched with51.1% cases(20).

The prevalenceof intestinal parasitosis from the boys is 40% while from the girls it's 35.9%,our result is closeto that Ould Ahmaed Salem and al (17),of Diouf JBN and al au Senegal(22, it is rather 23, **it's good to check the concordance of bibliographic reference**)and Boi Koné and al in Mali(29)

According to stool appearance,the prevalenceof intestinal parasitosis is most important at stool diarrhead levelwith 50,9% followed pasty stool with 34,4%, moldstool and liquid stoolwith 33,3%.

The Predominance of intestinalinfection at diarrhead stool level is maybesaid tointestinal infection manifestsoftenby a diarrhead syndromeand des abdominal aches . our resultis confirmed by Guamri Y.E and al in Maroc (18), by Yaro AS and al in Mali (9) and bySakkali H.E.B and al in Maroc (30). On the other hand for G. Tékp and al in Centre Afrique(12)and Boi Koné M et al (22, it is rather 29, **it's necessary to check the concordance of bibliographical reference**) rapport respectively a prevalence higher for pasty stool and liquid stool.

206 The germs encountered are dominated by protozoa with 81% followed yeast with 8,27%
207 then enterobacteriawith 7,9% and heminths with 2,63%, the predominance of protozoa is
208 found in others Mauritanian studyparticularly that Ould Abdallah and al in 2010 (28) and
209 Baba OASC in 2012 (17)with a prevalence of protozoarespectively 59,6%and 93,75% but
210 also in Senegal by Thiongane P and al in 2019(31), at Maroccoby Guamri Y.E and al in
211 2009 (18),at Mali by Yaro A.S and al (9) and Burkina by Erismann S and al (32).

212 On the other hand others studiesshow a predominanceof helminthon
213 theprotozoaparticularityTegen D and al (11) in Ethiopia , Diouf NJB and al (10) in Senegal
214 and André Edouard and al in Martinique(33).

215 Protozoan species are dominated by '*Entamoeba Coli*with 31,95% (n=85)followed by
216 *Giardias intestinal*with 26,31% (n=70) followed by *Entamoeba histolitica* 19,54% then
217 *Entamoeba dispar* 1,5% and *Trichomonas intestinal*with 1,5% des cas (n=4), our result is
218 close to the results of two other studies carried out in Mauritaniaby Ould Abdallahi and
219 al(28) and Baba O.A.S.C and al(17) as well as to Burkina by Sangaré and al (34) and in
220 Senegal by Thiongane P and al(31).

221 On the other hand in many others countries the results are different with a predominance of
222 *Entamoeba hystolitica* notably in Maroccoby Guamri Y.E and al (18), in Mali by Yaro A.S
223 and al(9),at Burkinaby Erismann S and al(32) and Camerounby Saotoing P and al (14) while
224 for Tékpá and al in Center Africa (12) , *the Ascaris lumbricoïdes* is the species more found
225 and Belhamri N and al in Marocco reports apredominanceof *Giardia intestinal*(19)

226 The Helminth represent 2,63% (n=7) are dominatedby *Hymenolepus nana* 1,87% of cases
227 (n=5) and *Ascarislumbricoïdes* 0,75% (n=2), our resultis identical to the one of Baba O.A.S.C
228 and al (17) and close to the one of Ouldabdallah and al (28) who has a predominance of *H.*
229 *nanafollowed to Strongyloides stercoralis*but both have prevalenceof geohelminthiasis

superieur to ours .the predominanceof *Hymenolepus nana* is also found inBurkina by Ouermi D and all (35).

The most of studies consulted have results superieurtooursand showa predominanceof *Ascaris lumbricoïdes*, notably the Diouf B.N.Jstudy and alin Senegalwith 18% for *Ascaris lumbricoïdes*(10), by Sabonete and al (36) in Mozambique with 65,8% for *Ascaris lombricoides*, in Maroccoby Guamri Y.E and al (18) with 11,87% for *Ascaris lumbricoïdes*and in Center Africaby Téka G and al(12) with 40,1% for *Ascaris lombricoïdes*.On the other hand in Senegal Ndiaye A and al(37) report theprevalencefor the helminthiasismuch weaker than we obtained , dominatedby *Ascaris lumbricoïdes*with 0,65% followed to *Ancylostoma duodenale*with 0,22%.

The bacteriaareresponsibleof 7,9%(n=21) of intestinal infection in our study , they are dominated by*Salmonella spp*with 7,14%(n=19), followed to *Shiguella spp*with 0,75% (n =2)our resultis differentto that reported in Mali by Boi Koné(29) with a predominance of *Escherichia coli*followed to *Salmonella spp*and that of Diouf S and al(38) who obtained a rate of bacterial infection to 10,5% dominated by*Escherichia coli* with 6% followed to*Salmonella spp*with 3,7% and *Klebsiella spp*with 0,7%. This differencecan be explained by diagnostic of method used.

We have obtained a prevalenceof 8,27% dominated by the *Candida albicans*with 4,5% followed to *Candida spp*with 3,75%our result is close to that reported by Diouf S and all (38)with 7,5% of *Candida* found in the intestinal infection .

Conclusion

Intestinal parasitosis constitute an important factor of morbidities and mortalities in the world ,our study show that the prevelance of intestinal parasitosis is more important from the children in Mauritania with a predominance of protozoa .

In a context of underdevelopment the negative impact of these intestinal parasitosis can be much more important in terms of morbidity and mortality , hence the need for the Mauritanian government to redouble its efforts in the fight against intestinal parasitosis.

UNDER PEER REVIEW IN IJAR

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TABLES AND FIGURES

Table I: Prevalence of intestinal infection according to age and sex

	BOYS	POSIT	FREQUE	GIRL	POSIT	FREQU	TOTA	POSITIF	FREQUEN
AGE (ANS)		IF	NCY	S	IF	ENCY	L		CY
[1 - 2]	64	23	35.9%	5	1	20%	69	24	34.7%
[3 - 6]	68	43	63.2%	77	34	44.15%	145	77	53.10%
[6 - 11]	187	64	34.2%	261	80	30.6%	448	144	32.1%
[12 - 17]	5	3	60%	35	18	51.4%	40	21	52.5%
TOTA	324	130	40.1%	378	136	35.9%	702	266	37.9%
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Table II: distribution of intestinal infection according to stool appearance

Appearance	total	Frequency (%)	Positif	Percentage (%)
Mold	120	17,1%	40	33,3%
Diarrhead	104	14,8%	53	50,9%
Liquid	30	4,3%	10	33,3%
Mucus	70	10%	21	30%
Pasty	378	53,8%	130	34,4%
Total	702	100%	266	37,9%

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Epecies	Number	(%)	Mold (%)	Diarrhead (%)	Liquid (%)	Mucus (%)	Pasty (%)
<i>Entamoeba coli</i>	85	31.95%	16(18.8%)	13(15.3)	1(1.2%)	6(7.05%)	49(57.6%)
<i>Entamoebahistolitica</i>	52	19.54%	8(15.4%)	9(17.3%)	2(3.8%)	7(13.4%)	26(50%)
<i>Entamoebadispar</i>	4	1.50%	0	1(25%)	1(25%)	0	2(50%)
<i>Giardia intestinale</i>	70	26.31%	12(17.1%)	22(31.4%)	3(4.28%)	2(2.8%)	31(44.3%)
<i>Trichomonas</i> <i>intestinale</i>	4	1.50%	0	4(100%)	0	0	0
<i>Isospora</i>	1	0.37%	0	0	0	1(100%)	0
<i>Hymenolepus nana</i>	5	1.87%	1(20%)	0	1(20%)	0	3(60%)
<i>Ascaris lumbricoides</i>	2	0.75%	0	0	0	0	2(100%)
<i>Candida albicans</i>	12	4.51%	2(16.6%)	1(8.3%)	2(16.6%)	0	7(58.3%)
<i>Candida spp</i>	10	3.75%	2(20%)	1(10%)	1(10%)	2(20%)	4(40%)
<i>Salmonella spp</i>	19	7.14%	0	8(42.1%)	3(15.8%)	6(31.6%)	2(10.5%)
<i>Shiguellaspp</i>	2	0.75%	0	2(100%)	0	0	0
Total	266	100%	41 (15,41%)	61 (22,93%)	14 (5,26%)	24 (9,02%)	126 (47,36%)

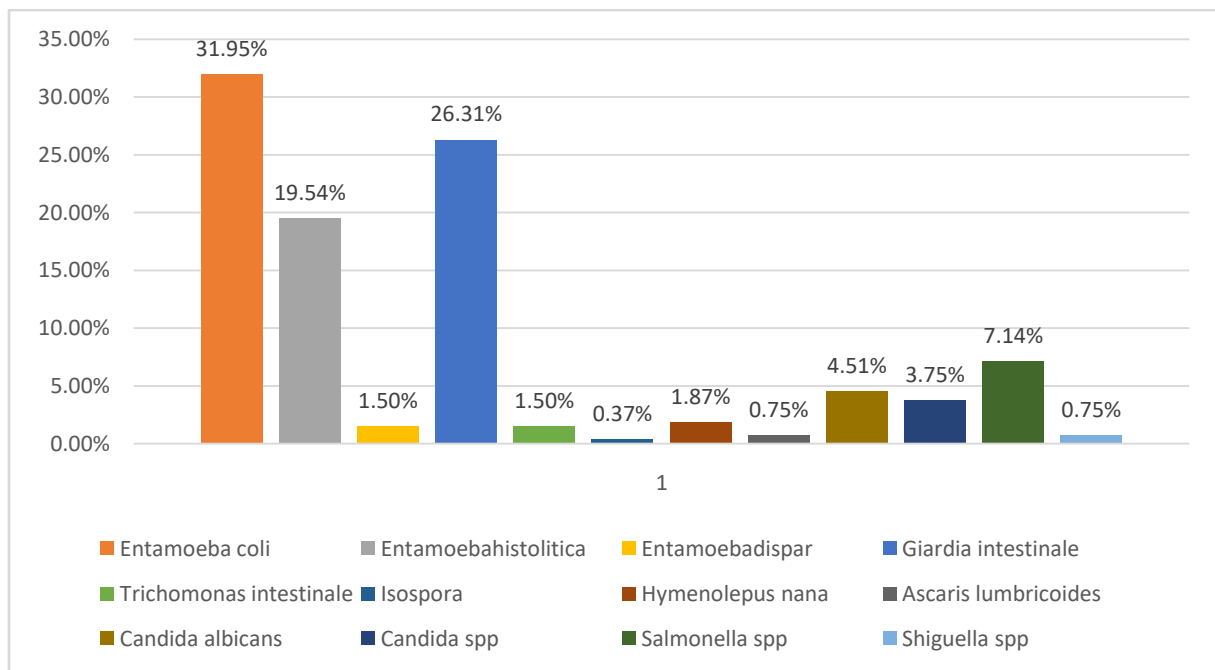


Figure 1 : Found species spectra