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Asymptomatic Infection with Intestinal Parasites at Kpingni Public Primary School in Dassa-Zoumé (Benin)

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A B S T R A C T

Digestive parasitosis is a parasitic disease that is rife in developing countries, especially among children. In order to contribute to the fight against this disease, we studied the epidemiological profile of digestive parasitosis in children at the Kpingni public primary school in the commune of Dassa-Zoumé, Benin. Stool samples were collected from children aged between 3 and 16 years and subjected to parasitological examination (macroscopic and microscopic). Macroscopic examination looked for consistency, the presence of non-faecal admixtures and adult worms. The direct test with physiological water and the Willis method were carried out before microscopic examination. Of the 125 school children who took part in this study, 31 harboured a parasite, giving an overall prevalence of 24.80%, with a male predominance of 61.29%. Learners aged 12 to 16 had the most parasites (29.54%), followed by those aged 3 to 9. 58.06% of parasites diagnosed were protozooses, compared with 41.94% helminthiasis. Amoebiasis was the most commonly diagnosed parasitosis (58.06%), followed by hookworm (32.26%). All amoebiasis cases were diagnosed by the direct test with physiological water, whereas the Willis method was more effective in the case of hookworm. Mass campaigns to screen for digestive parasitosis and treat parasites will make it possible to effectively combat the asymptomatic carriage of digestive parasites in schools.

Introduction

Human gastrointestinal parasitic infections are a major public health problem worldwide, particularly in impoverished tropical regions (Bourrée, 2015). These infections are caused by parasites that develop in the gastrointestinal tract (Afriad, 2018). These parasites belong to two main phyla:protozoa, which are unicellular organisms, and helminths, which are multicellular organisms (Baraha, 2020). The World Health

Organization (WHO) estimates that more than 1.5 billion people, or nearly 24% of the world's population, are infected with helminths (WHO, 2022). Helminthiasis are among the most common infections in the world, particularly affecting the poorest and most disadvantaged communities. Recent data suggest that parasites are responsible for 20-30% of cases of acute diarrhoea in children in tropical regions (Zulfiqar *et al.,* 2020).

Studies on the prevalence and risk factors of parasitic infections in children have been conducted in 22 developing countries (Peter *et al.,* 2016). The most common parasitic infections identified include amoebiasis, ascariasis and hookworm infection, with prevalence rates varying widely between countries and age groups (Zulfiqar *et al.,* 2020). Stool parasitological tests aid in diagnosis. This study aims to determine the prevalence of asymptomatic carriage of gastrointestinal parasites among school children at the Kpingni Public Primary School in the Collines Department of Benin.

Materials and Methods

The study used, among other things, freshly collected stool samples, a microscope, a centrifuge and the Willis flotation solution. This was a prospective descriptive study conducted at the medical diagnostic laboratory of the Zone Hospital in Dassa-Glazoué, Collines Department, Benin. All children attending the Kpingni Public Primary School who agreed to participate were enrolled in the study. Those who were not able to provide stool samples despite their willingness to do so were excluded. Prior to sample collection, both teachers and students were educated about digestive parasitic infections through a behaviour change communication campaign.

This campaign focused on the definition of digestive parasitic infections, their causes, consequences and, most importantly, their prevention. Stool samples were collected in clean, dry, wide-mouth plastic containers and transported to the laboratory in cool packs. Macroscopic examination noted the consistency of the stool (hard, soft, mushy, dysentery, diarrhoea, etc.), the presence of non-fecal elements (food particles, mucus, blood), and the possible presence of adult parasites visible to the nakedeye.

Fresh preparation with physiological saline and the Willis flotation method were used for microscopic examination. The direct test with physiological water helps to identify helminth eggs, larvae, cysts and vegetative forms of protozoa, coccidianoocysts and microsporidian spores. The Willis method involves mixing stool samples with a saturated sodium chloride solution to allow parasite eggs to float to the surface for collection.

Results and Discussion

Study population

The study included 125 stool samples.

Gender distribution

The figure below shows the gender distribution of the study population, with 52% of participants being female.

Breakdown of study population by age bracket

The figure below shows the age distribution of the study population.

Analysis of this figure shows that 36.80% of the study population is aged between 9 and 12. This age group is the most represented.

Overall prevalence of digestive parasites

Figure 3 shows the overall prevalence of digestive parasites.

Among the 125 students tested, 31 had a positive parasitological diagnosis, corresponding to a prevalence rate of 24.80%.

Breakdown of positive cases by sex

Figure 4 shows the distribution of positive cases by gender.

Males were more frequently affected (61.29%) than females (38.71%).

Distribution of samples by stool consistency

Table 1 shows the results of the macroscopic examination.

Table.1 Stool consistency

Stool appearance	Numbers	Frequencies (%)
Diarrhoeal	4	3.20
Pasty	64	51.20
Hard	57	45.60
Total	125	100

51.2% of the stool samples in this study were found to be pasty.

Positive cases by stool consistency

Table 2 shows the positive cases by stool consistency.

Table.2 Stool consistency of positive cases

Stool appearance	Numbers of positive cases	Frequencies
Diarrhoeal	01	3.22%
Pasty	19	61.3%
Hard	11	35.48%
Total	31	100%

Analysis of the above table shows that 61.3% of the samples tested positive were pasty.

Distribution of positive cases by parasite species detected

Table 3 shows the distribution of positive cases by parasite species detected.

Table.3 Profile of positive cases by parasites species detected

Group of parasites	Parasite species	Numbers	Frequencies (%)
Protozoa	*Entamoeba histolytica*	16	51.61
	Entamoeba coli	02	6.45
Helminths	*Ascaris lumbricoides*	03	9.68
	Ancylostoma duodenale	10	32.26
Total		31	100

The table above shows the four parasitic species observed on microscopic examination. *Entamoeba histolytica* (51.61%) was the most common, followed by *Ancylostoma duodenale* (32.26%).

Distribution of positive and negative cases by age group

Table 4 shows the results by age group.

Table.4 Distribution of positive cases by age group

Age groups	Participants	Positive cases	Negative cases
[3-9[	35	9 (25.71%)	26 (74.28%)
[9-12[	46	9 (19.56%)	37 (84.43%)
[12-16]	44	13 (29.54%)	31 (70.45%)
Total	125	31 (24.80%)	94 (75.20%)

Pupils aged 12 to 16 (29.54%) are most affected, followed by those aged 3 to 9 (25.71%).

Distribution of samples after microscopic examination

Figures 5 and 6 show that the Willis technique is effective in detecting helminth eggs, while the fresh state is more effective for amoeba cysts. This study was conducted at Kpingni Public Primary School to determine the prevalence of asymptomatic digestive parasitic infections among students. Of the 125 stool samples analysed, 31 were positive, giving a prevalence of 24.80%. Nationally, this rate is higher than the 4.29% found by Kansoulo (2016) in the district of Sehoun, but lower than the 53.12% found by Kiki (2016) in Boukoumbé and the 40.10% found by Medoatinsa Seindé Espérance (2024) in Aguégués. In Côte d'Ivoire, Ohouya (2015) found a prevalence of 17%, while Beavogui *et al.,* (2021) reported a prevalence of 15% in Guinea. The variation in these results could be due to differences in sample sizes, study populations, and sanitary, hygienic, geographic, socioeconomic, nutritional and cultural factors (Farouki, 2022). Diagnostic techniques also play a role; for example, Medoatinsa's team observed prevalence rates ranging from 17.33% using direct fresh examination to 40.10% using the Bailenger method and 30.20% using the Willis technique.

The prevalence of parasitic infections by sex shows a male predominance (61.29%), in line with the findings of Zekri and Merrouche (2017) in Constantine (55.70%) and Dani and Saib (2017) in Tizi Ouzou (63%). However, Kasni and Saidouni (2016) observed a female predominance (60%), while Savadogo and colleagues reported no gender differences. In terms of age, students aged between 12 and 16 years were most affected, which

mirrors the findings of Kyambika *et al.,* (2017) in Congo, where 91.3% of parasitised individuals were aged between 13 and 16 years. This may be due to the fact that prevention programmes, such as the Expanded Programme on Immunisation, which targets children up to 9 months, and anti-helminthic campaigns, which focus on children aged 0-5 years, do not cover older children aged 12-16 years in Benin. At this age, male students often engage in activities that expose them to parasitic infections. Protozoan infections accounted for 58.06% of cases, while helminth infections accounted for 41.94%. These results are lower than those reported by Mustapha (2016) in Morocco, where protozoan infections predominated with 93.6%, but they are in line with the findings of Sisinto-Savi de Tovè *et al.,* (2017) at the CNHU-HKM in Cotonou, where protozoan infections were also the most common. On the other hand, our results contrast with those of Mohammed and Mohammedi (2017) in Guadeloupe, who reported a predominance of helminth infections (72.3%), and Medoatinsa's team, who found 86.42% helminth infections in Aguégués, Benin.

Figure.1 Sex breakdown of the study population

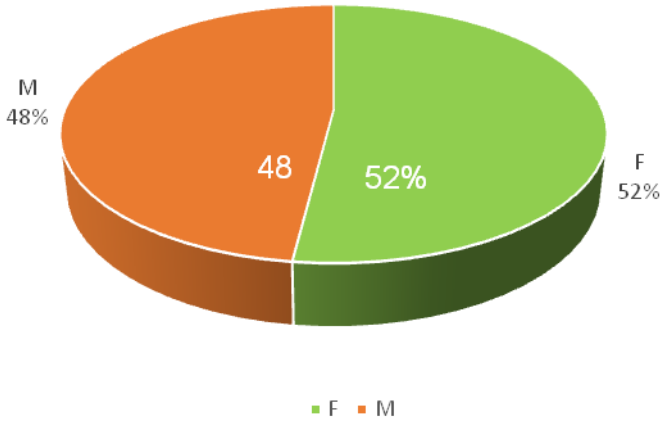


Figure.2 Breakdown of study population by age group

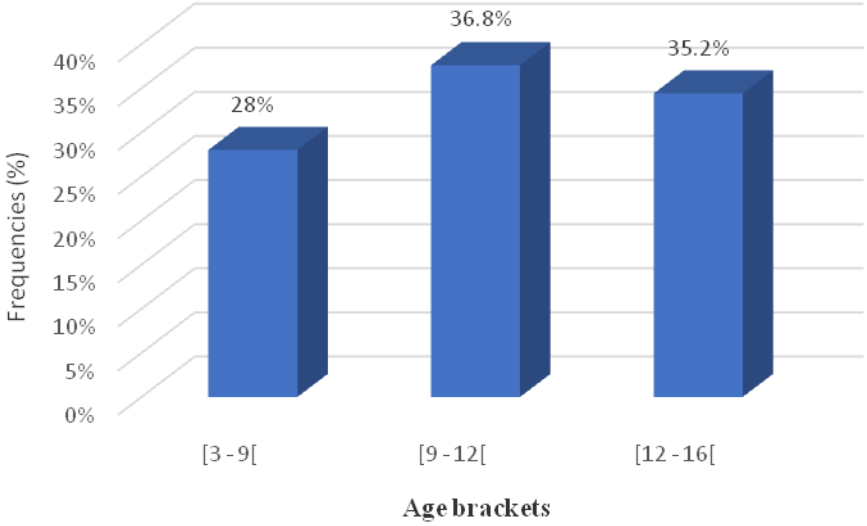


Figure.3 Overall prevalence of parasites diagnosed

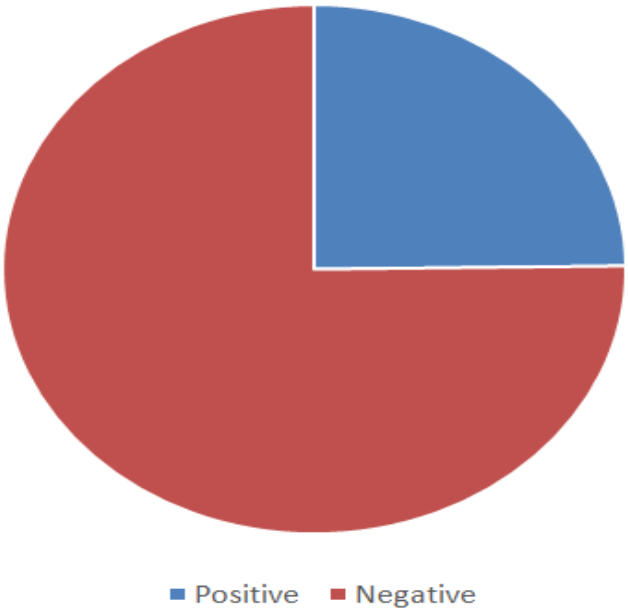


Figure.4 Breakdown of positive cases by sex

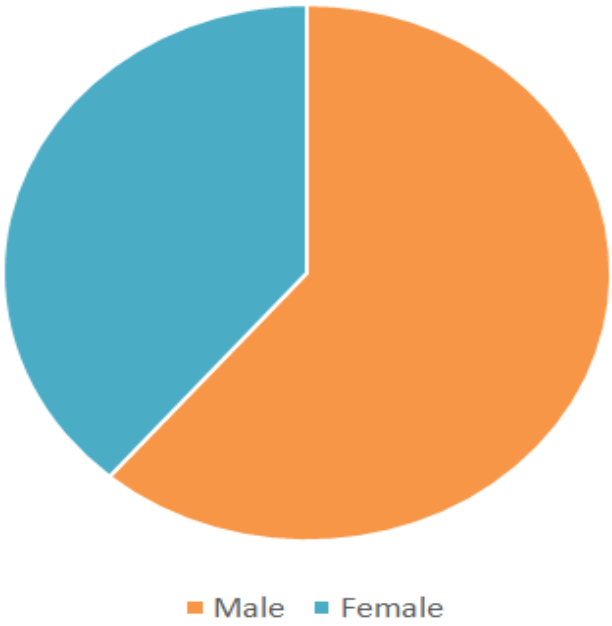


Figure.5 Diagnostic performance of techniques used to detect amoeba cysts

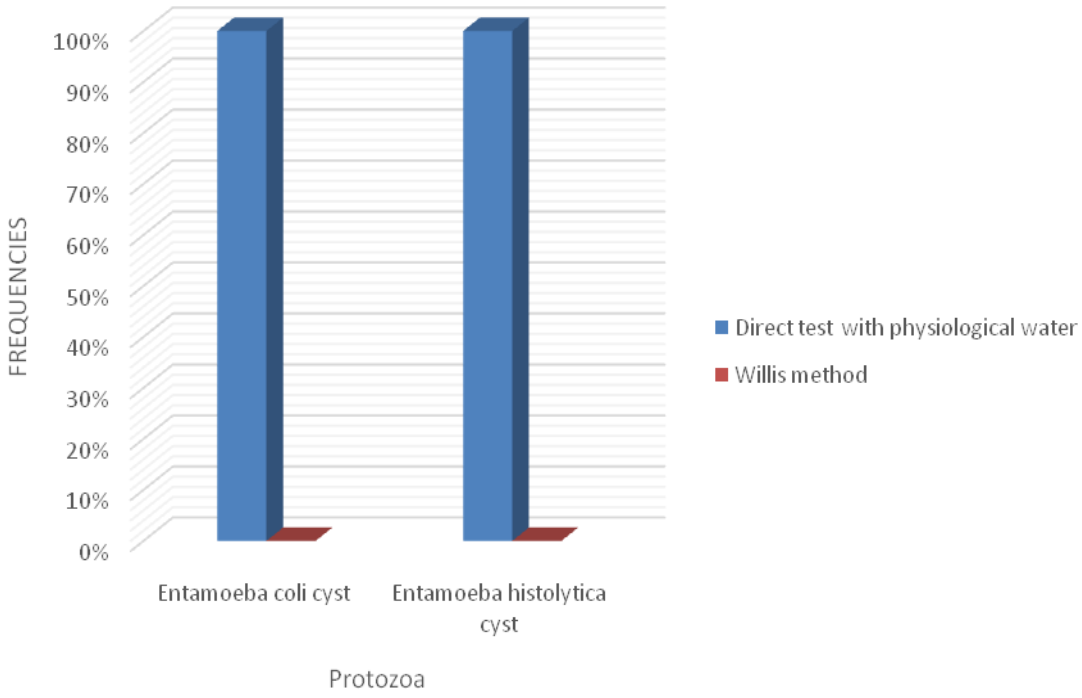
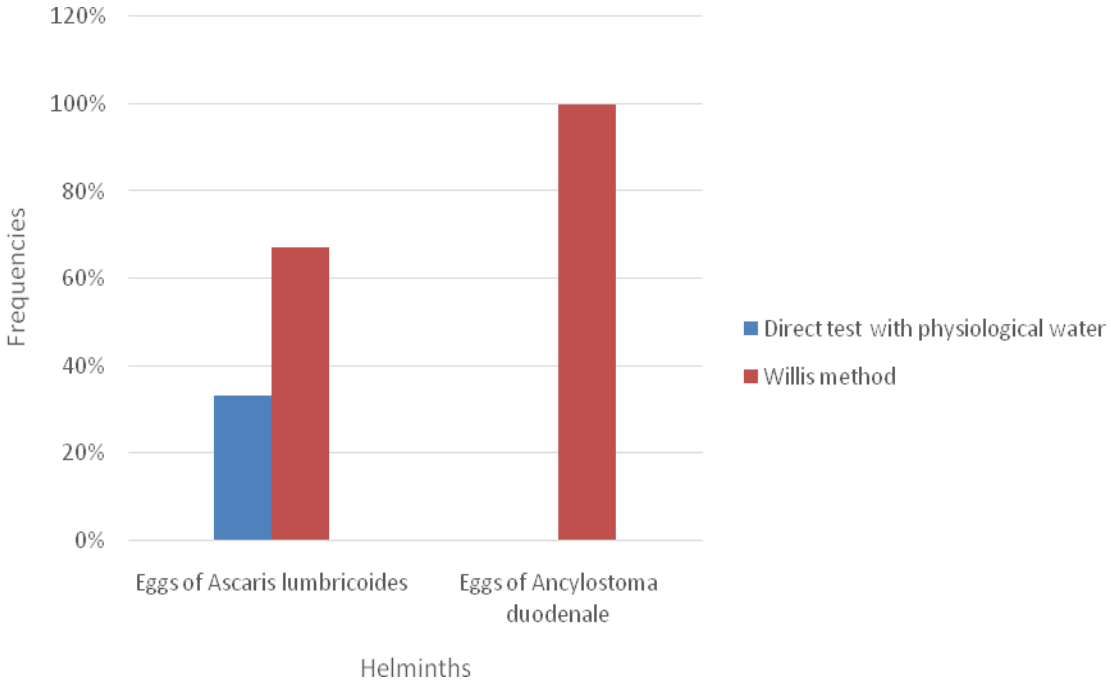


Figure.6 Diagnostic performance of techniques used to detect helminth eggs



The parasites identified in this study included *Entamoeba histolytica* (51.61%), *Entamoeba coli* (6.45%), *Ascaris lumbricoides* (9.68%) and *Ancylostoma duodenale* (32.26%). The prevalence of amoebiasis is similar to that found by Farouki (2023) in Morocco (6.19%). Amoebas are mainly transmitted by dirty hands, faecal

contamination and consumption of unwashed fruit and raw vegetables, while hookworm larvae penetrate the skin of people walking barefoot in muddy environments. The high prevalence of parasitic infections in Kpingni may be related to the rural nature of the area, where children often work alongside their parents in the fields. In this study, 51.20% of the stool samples had a mushy consistency. This finding is consistent with a study conducted in Algeria by Guenidi (2020), who reported that mushy stool consistency was the most common (79.28%), and was also observed by Medoatinsa and colleagues (2022) in Benin. In terms of diagnostic techniques, direct test with physiological water was more effective in detecting protozoan cysts, while the Willis technique was more effective in diagnosing helminth infections.

This study contributes to the fight against digestive parasitic infections by assessing their prevalence among students of the Kpingni Public Primary School.

After sensitising both teachers and students, stool samples were analysed at the laboratory of the Dassa-Glazoué Zone Hospital.

The overall prevalence was found to be 24.80%, with male students and those aged between 12 and 16 years most affected. The direct test with physiological water was more effective in diagnosing protozoan infections, while the Willis technique was more suitable for diagnosing helminths. This study shows that asymptomatic carriage of digestive parasites is a reality in Beninese primary schools and highlights the importance of extending such studies to other schools. Raising awareness among school children is essential to effectively combat these infections.

Author Contributions

Medoatinsa Seindé Espérance: Investigation, formal analysis, writing—original draft. Tchogoun Pascal: Validation, methodology, writing—reviewing. Tuo Karim, Degila Virgile:—Formal analysis, writing—review and editing. Akpo Roland: Investigation, writing—reviewing. Alihonou Gaelle Ruth Mahugnon: Resources, investigation writing—reviewing. Agbangnan Dossa Pascal: Validation, formal analysis, writing—reviewing. Senou Maximin: Conceptualization, methodology, data curation, supervision, writing—reviewing the final version of the manuscript.

Data Availability

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethical Approval Not applicable.

Consent to Participate Not applicable.

Consent to Publish Not applicable.

Conflict of Interest The authors declare no competing interests.

References

Afriad Y. (2018). Épidémiologie des parasitoses intestinales chez la population de la ville d'Agadir. Thèse de Doctorat, Faculté de Médecine et de Pharmacie, Marrakech.

Baraha N. (2020). Épidémiologie des parasites intestinaux dans la région d'Ouarzate. Thèse de Doctorat, Faculté de Médecine et de Pharmacie, MARRAKECH, 2 p.

Beavogui A. H, Toure A. A, Traore S, Koropogui M, Sylla Y. S, Camara D. (2021). Profil épidémiologique des parasitoses intestinales chez les enfants d'âge scolaire reçus au centre médical communal de Matam, Conakry, Guinée. Revue Africaine et Malgache pour la recherche Scientifique/ Science de la Santé- ISSN 2424-7243(3) : 21p.

Bouree P. Traitement des parasitoses intestinales. Revue du médicament 2015 ; 17 : 3-12.

Dani. F and Saib. M. Parasitoses intestinales diagnostiquées au CHU de Tizi-Ouzou, 2017.

Farouki L, El Dirani Z, Abdulrahim S, Akl C, Akik C, McCall SJ. The prevalence of female genital mutilation: a systematic review and meta-analysis of national, regional, facility and school-based studies. medRxiv. 2022: 2022.03.08.22272068.

Guenidi C. (2020). Parasitoses intestinales chez la population infantile et adulte en milieu hospitalisé. Mémoire de Master, Université de Biskra, Faculté des sciences de la nature et de la vie.

Hadj Mohammed F. Z and Mohammedi. A. Etude de la prévalence des parasitoses intestinales chez l'enfant diagnostiquées au sein du laboratoire de parasitologie-Mycologie médicale du CHI de Tlemcen, Mai 2017.

Kansoulo P. (2016). Bilan coprologique chez les enfants âgés de 5 à 15 ans dans un contexte de traitement par l'USAID dans l'arrondissement de Sehoun. Rapport de stage de fin de formation. Ecole Polytechnique d'Abomey Calavi, Bénin.

Kasmi H. and Saidouni A. (2016). Etude de la prévalence des protozooses intestinales diagnostiquées au sein de du laboratoire de parasitologie-mycologie du C.H.U de Tlemcen. Thèse de Doctorat. Université Abou Bekrbelkaid, Faculté de médecine, Algérie.

Kiki P., J. (2016). Etude de la performance diagnostique des méthodes de Willis et de Bailenger en coprologie parasitaire au centre de santé de la commune de Boukoumbe. Rapport de stage de fin de formation. Ecole Polytechnique d'Abomey Calavi, Bénin.

Kyambika B. C, Jabari M. P, Mulongo M. P. Profil des parasitoses intestinales chez les enfants d'âge scolaire de Kiliba (Est de la RD Congo). Med Sante Trop 2017 ; 27 : 209-213. https://doi.org/10.1684/mst.2017.0686.

Medoatinsa Seindé Espérance, Akpo Ogouyomi Roland, Tchogou Pascal, Sounnouvi Paul, Tessi Irène, Atchade Pascal, Agbangnan Pascal, Senou Maximin. (2024). Diagnostic performance of the Willis, Ritchie and Bailenger methods in Parasitic Coprology. Int. J. Adv. Res. Biol. Sci. 11(3) : 27-36. http://dx.doi.org/10.22192/ijarbs.2024.11.03.003

Mustapha Raboua (2016). Epidémiologie des amibes: Expérience du service de Parasitologie de l'hôpital Militaire Avicenne de Marrakech sur une période de 10 ans. Thèse de doctorat, Université Cadi Ayyad, Maroc, 101p.

Naima El Farouki. (2023). Prévalence des parasitoses intestinales chez l'enfant scolarisé. Thèse Doctorat. Université Mohammed V De Rabat, Maroc, 71p.

Ohouya Dahi Ghislaine, Prévalence des parasitoses intestinales chez les enfants de 0 à 5 dans la communauté d'Anonkoi 3. Université Félix-HouphouëtBoigny Abidjan. Thèse N° 1735/2015.

Peter G. Pappas, Carol A. Kauffman, David R. Andes, Cornelius J. Clanci, Kieren A. Marr, Luis Ostrosky-Zeichner, Annette C. Reboli, Mindy G. Schuster, Jose A. Vazquez, Thomas J. Walsh, Theoklis E. Zaoutis, Sobel Jack D. (2016). Executive Summary: Clinical Practice Guideline for the Management of Candidiasis: 2016 Update by the Infectious Diseases Society of America Clinical Infectious Deseases, Volume 62, Issue 4, 15, page 409-417.

Sissinto-Savi De Tové Y., Hounto A., Attinsounon C. A., Affolabi D., Damien G. B., Tchankpan F., Omial K., Kinde-Gazard A., D. (2017). Prévalence des parasitoses intestinales au CNHUHKM de Cotonou, Sud du Benin de 2003 à 2015. Journal de la Recherche Scientifique de l'Université de Lomé, vol 19 No.4.

World Health Organization.2022. World Health Statistics 2022. https://www.who.int/news/item/20-05-2022-world-health-statistics-2022

Zekri A. and Merrouche K. (2017). Les protozooses intestinales diagnostiquées au laboratoire de l'établissement hospitalier Didouche Mourad. Mémoire de Master. Université des frères Mentouri Constantine. Faculté des sciences de la nature et de la vie. Département de biologie appliquée.

Zulfikar A.B., Nadia Akseer, Emily C Keats, Tyler Vaivada, Shawn Baker, Susan E Horton, Joanne Katz, Purnima Menon, Ellen Piwoz, Meera Shekar, Cesar Victora, Robert Noir (2020). How countries can reduce child stunting at scale: lessons from exemplar countries. The American Journal of Clinical Nutrition. Volume 112, Supplement 2, Pages 894S-904S.

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