BIODIVERSITY OF INTESINAL PARASITES IN THE HEALTH DISTRICT OF EFOULAN (CENTER REGION OF CAMEROON): INFESTATION IN STOOLS AND PARASITE ASSOCIATION

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ABSTRACT

Context: Intestinal parasites remain a significant public health problem in the tropical and subtropical regions. **Methods:** This study aimed to investigate the biodiversity, the prevalence and parasitic associations of intestinal parasites among hospitalized patients in the Health District of Efoulan. Eighty-three 83 stool specimens were sampled from patients aged 1 to 28 years. A questionnaire was administered in order to collect data on factors that may influence the prevalence of intestinal parasites. **Results:** Results revealed that 66 of the examined people were infested, yielding an overall infestation rate of 80 ± 8.61%. Patients in the age group of 11-20 years had the highest infestation rate (88 ± 10.83%), followed by those of 21-28 years (80.00 ± 20.25 %)

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and those aged 0-10 years (70.59 ± 15.32 %) ; but differences in infestation rates between age groups were not statistically significant (P > 0.05). Twenty three (23) parasite species were identified, with *Entamoeba histolytica* being the most prevalent species (39.76 ± 10.50 %). Polyinfestation was recorded in 43 (65.15 ± 11.51%) of the examined subjects and diparasitism was more frequent (24.24 ± 12.81%). These findings emphasize the need for improved sanitation and health screening to reduce the prevalence of intestinal parasites.

I-INTRODUCTION

Intestinal parasitic infections (IPI) refer to diseases caused by parasites that primarily affect the gastrointestinal tract of both animals and humans (Ongbassomben, 2021 ; Bedziga Bedziga & Yongsi, 2023 ; Imane *et al.*, 2023 ; Koga et Jouego, 2024). These parasites are broadly classified into two main categories : protozoa and helminths. Intestnal protozoa are single-celled organisms, such as *Giardia* Stiles, 1902, *Cryptosporidium* Tyzzer, 1907, and *Entamoeba histolytica* Fritz Schaudinn*,* 1903, which typically have simple life cycle requiring only one host (Natchema *et al.*, 2020). In contrast, helminths are multicellular parasitic worms, including nematodes (roundworms) and platyhelminths (flatworms, including tapeworms). These parasites often have complex life cycles involving multiple hosts (Benesh *et al.*, 2021). IPI are a significant public health concern in many developing countries, including Cameroon, affecting an estimated 3.5 billion people globally, with approximately 450 million showing clinical symptoms (Belete *et al.*, 2021).

In 2004, a report by Cameroon's Secretary of State for Public Health stated that the country's population was estimated at 16.1 millions, a substantial number of infections occurs in low-income regions, where factors such as inadequate sanitation and limited healthcare access exacerbate the issue. In such areas, individuals are often infected with multiple parasites simultaneously, a condition known as polyparasitism (Oyono *et al.*, 2019 ; Bilong Bilong *et al.*, 2021). The effects of these infections can be severe, leading to significant morbidity and mortality, particularly in regions where parasites are endemic (Tankoua-Tchounda *et al.*, 2022). In many tropical and subtropical regions, the hot and humid climates provide ideal conditions for the transmission of these parasites. Geohelminths, which include species such as *Ascaris lumbricoides* Linnaeus, 1758, *Necator americanus* Stiles, 1902, *Ancylostoma duodenale* (hookworms) Dubini, 1843, and *Trichuris trichiura* (whipworm) Linnaeus, 1771, are among the most common human infections worldwide, and protozoa species such as *Giardia*

duodenalis Van Leeuwenhoek, 1681 and *Entamoeba histolytica* Fritz Schaudinn, 1903 infect about 200 to 500 million people respectively, with over a quarter of the world's population being infected (Absar *et al.*, 2010 ; Kemba *et al.*, 2022). While these infections are frequently associated with rural areas, they also thrive in urban environments with poor sanitation, as observed in many African communities (Ongbassomben, 2021 ; Demeke *et al.*, 2021 ; Koga *et al.*, 2024).

Urbanization in developing countries, such as Cameroon, often leads to uncontrolled population growth, disorganized housing, and the rise of unplanned slums. These conditions, characterized by overcrowding, inadequate sanitation, and poor hygiene practices, create environments conducive to the transmission and persistence of parasitic diseases (Yamssi *et al.*, 2020 ; Bilong Bilong *et al.,* 2021 ; Bedziga Bedziga & Yongsi, 2023). In tropical regions, where untreated sewage is often discharged into freshwater sources, people are frequently exposed to contaminated soil, further increasing the risk of infection. People of all ages are exposed to IPI, however children are particularly vulnerable to these infections due to their undeveloped immunity, limited awareness of hygiene, and higher nutritional needs, which make them more susceptible to the adverse effects of parasitic diseases (Ahmed & Abu-Sheishaa, 2022 ; Kemba, 2024).

The distribution and prevalence of intestinal parasites vary across regions, depending on environmental, socioeconomic, and geographical factors (Oyono, 2020). Thus, studying the prevalence of IPI is essential for developing effective control strategies and assessing the risks faced by vulnerable communities (Kumurya *et al.*, 2020 ; Hailu *et al.*, 2021).

Clinically, intestinal parasitic infections can be presented with a variety of symptoms, including abdominal cramps, vomiting, nausea, diarrhea, fever, anemia, malabsorption, and itching (Botero *et al.*, 2003 ; Demeke *et al.,* 2021 ;   Koga *et al.,* 2024). In an effort to control these infections, particularly among school-aged children, the World Health Organization (WHO) recommends preventive chemotherapy using albendazole or mebendazole for geohelminthiasis and praziquantel for schistosomiasis. However, while these treatments reduce the parasitic burden, they do not prevent reinfection, highlighting the need for comprehensive public health interventions to achieve sustainable control (Djieukap-Njieyap *et al.*, 2022). Despite the fact that a number of studies have been conducted on intestinal parasitic infections in Cameroon (e.g. Brice *et al.*, 2019 in south Cameroon, Oyono *et al.*, 2019 in Center Region of Cameroon), there is little known in the occurrence of intestinal protozoa and

helminths parasites towards hospitalized patients in Centre Region of Cameroon in general, and specifically in Efoulan District.

This study aimed to investigate the epidemiology of intestinal helminths and protozoa parasites towards patients in Efoulan Health District. Specifically, the study seeks to : (i) inventory the different species of intestinal parasites in the stool of patients visiting the Efoulan District Hospital, (ii) determine the prevalence of parasite species in the stool of examined patients in the Efoulan District Hospital, and (iii) identify parasitic associations in infested patients visiting the Efoulan District Hospital.

II- MATERIALS AND METHODS

II-1-Study area

The study was conducted in Efoulan Health District, a small neighbourhood in the southern part of the city of Yaoundé Cameroon, located in the District of Yaoundé 3, over a period of 3 months from the 15th May to August 25th 2024. Efoulan is bordered to the East by the Nsam and Dakar, to the North by the catholic mission of Mvolyé, to the South by Obobogo, and West by the Nsimeyong (Figure 1). It is situated at an average altitude of approximately 750 meters above sea level, with a geographical coordinate of N3°50'11'' latitude and 11°30'22'' longitude (Suchel,1987). The study area was chosen because it is one of the main Health District in the Yaounde city, the consent of the hospital Director and his staff, and due to patient availability and/or accessibility for our findings.
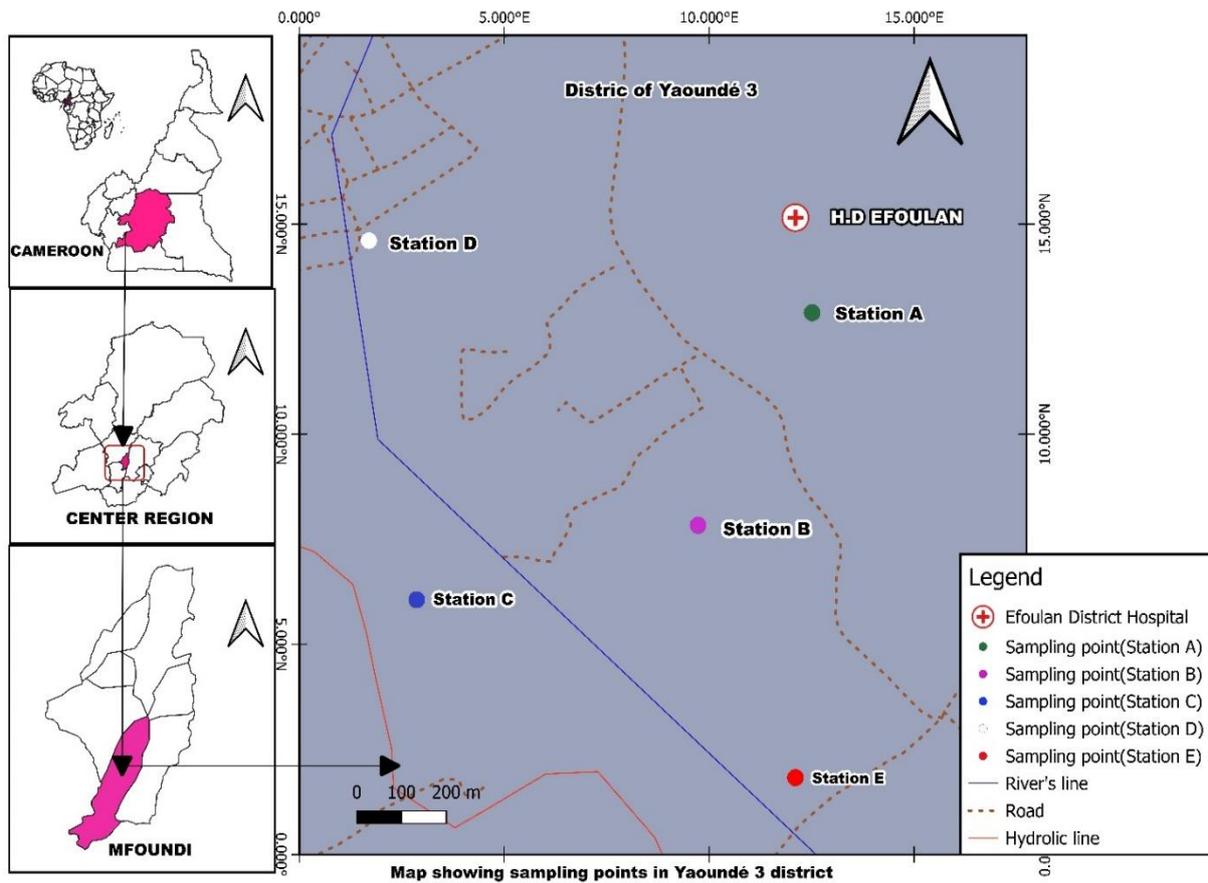
Figure 1 : Map of the study area (Open streets Map 2024-QGIS).

II-2-Selection of the study population for stool sampling

The study population was comprised with convenance children and adults of both sex, aged 1 to 28 years who were hospitalized during the dada collection period of the 3 months ; the selected patients were informed about the study aims and were invited to participate. Those who expressed their interest and/or approval statement were included in the study. Participants were given a structured individual questionnaire, including who would have taken any antiparasitic medication within the past 4 weeks, especially against the targeted parasites taxa (helminths and/or protozoa parasites), in order to exclude them of the study.

II-3-Ethical consideration

The study protocol was viewed and approved by the Centre Regional Ethics Committee for Health Research. At the beginning of the study, the objective and the purpose of the study were explained to the participants. Written ethical approval statement were obtained from all participants before data collection. Confidentiality was maintained throughout the study.

II-4-Data Collection

A total of 83 participants (30 males and 50 females) were included in this cross-sectional study. Questionnaires were performed to collect information about the participant's sex, age, weight, and socio-demographic factors. This included the source of drinking water, presence or absence of a latrine in the house, habits of washing hands after using the latrine, habits related to hygiene (such as washing hands after using the latrine and before and after eating), and practices involving food (such as washing vegetables or fruits before eating and habit of eating raw vegetables). Questions regarding the participant's knowledge of personal hygiene practice and environmental sanitation were also included. The questionnaires were pre-tested outside the study area to ensure clarity and effectiveness. Each participant was provided with a labelled stool container and instructed on the proper method of stool collection to avoid contamination. The collected stool samples were fixed with sodium azide to preserve the organism for a period of time and then processed in the Laboratory of Parasitology and Ecology of the Faculty of Science of the University of Yaoundé I for parasitological examination and enumeration.

II-5-Stool analysis

Stool analysis was performed using direct wet mont and Kato-Katz thecniques which are two diagnostic methods commonly used for the detection of parasites in stool samples (Alaaeldin *et al*., 2016).

-Direct wet mount Technique

The direct wet mount technique was used as a classic diagnostic one in the medical laboratories for the detection of parasitic forms such as protozoan trophozoites, cysts, oocysts, helminth eggs and larvae. To prepare a wet mount, with a marker, the identification number of each participant in the study was written at one end of the slide. A drop of physiological saline was placed in the middle of the left half of the slide whereas a drop of Lugol was placed in the middle of the right half of the slide. Using a wooden applicator, a small portion of stool samples (approximately about the size of match head) was taken and mixed with a drop of saline water and Lugol to create a homogeneous solution. Each drop was covered gently with a coverslip to avoid air bubbles, the slide was placed on a binocular optical microscope and the preparation was examined systematical under 10x then at 40x objectives (WHO, 2019).

-Kato-Katz technique

The Kato-Katz technique is a widely used method for diagnosing intestinal parasitic infections, particularly helminths (worms). It allows to detect and quantify the eggs in stool samples. In this method, a small portion of stool was obtained with the help of a wooden applicator pressed through a mesh screen to remove large particles. A portion of the sieved sample was then placed in the hole of a template (opening of about 41,7mg) placed at the center of a microscope slide, the excess was thus removed by scraping the surface of the template. Cellophane paper previously soaked in Kato solution (1mL of green 3% Malachite in a concentration of +100 mL of distilled water +100 mL of pure glycerin) for at least 24h was removed with the help of a forceps and placed over the stool sample. It was then spread evenly by gently rolling a test tube over the cellophane paper. The preparation obtained was analyzed under an optical microscope at a magnitude of 10x and then 40x (katz *et al.*, 1970).

II-6-Risk factors for targeted parasites taxa acquisition

Selected patients for this study were interviewed to obtain information about habits which can influence the acquisition of intestinal parasites. The main risk factors assessed here were regular washing of fruits and vegetables before consumption, treatment of water before consumption, regular hands washing with soap after defecation, regular hand washing with soap before and after meals, habits of using latrines for defecation and walking barefooted.

II-7-Data Analysis

Data collected were computerized into Microsoft Excel version 2016 for descriptive analysis. Subsequently, the data were mathematically analyzed using the Chi-square test to compare parasitic prevalences between individuals of both sexes, across the age groups, and the frequencies distribution of binary responses yes/no from risk factor analysis. All calculations were performed with Past software version 3.1 and XLSTAT 2024 at the 5% confidence level.

III-RESULTS

III-1-Number of positive and negative cases

Among the 83 patients examined in our study, 66 were found to be infected with one or more targeted parasites species, yielding a global infestation rate of 80 ± 8.61%. In contrast, 17 subjects were tested negative, accounting for 20 ± 8.61 % (Figure 2).
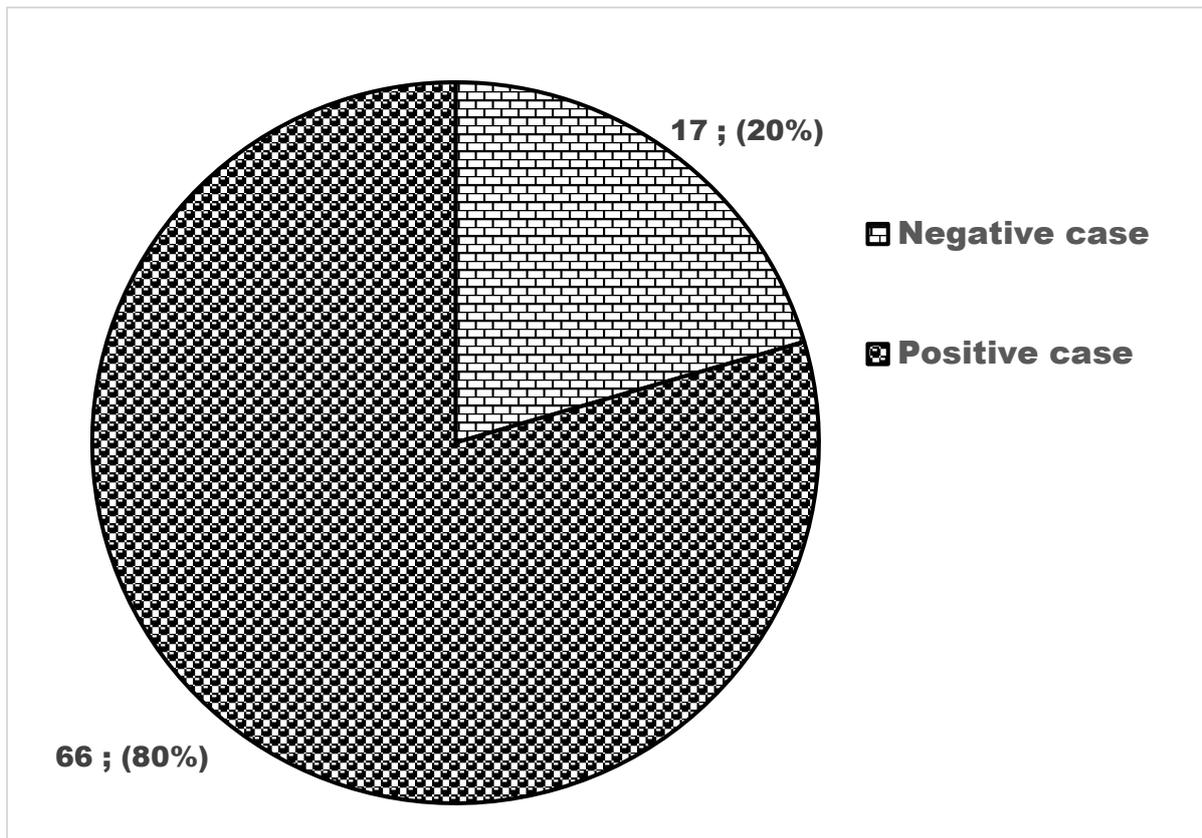
Figure 2 : Percentage of positive and negative cases in examined stools.

III-2- Age range infestation rates of examined patients

Among the 83 samples analyzed, 34 were obtained from individuals aged 0–10 years, 34 from those aged 11–20 years, and 15 from individuals aged 21–28 years. The infestation rates of the three age classes were 70.59 ± 15.32 % for the 0-10 year(s) age classe ; 88.23 ± 10.83% for 11-20 age class and 80.00 ± 20.25% for 21-28 age class. No statistically significant difference was observed between infestation rate values of the different age classes (P >0.05) (Figure 3).
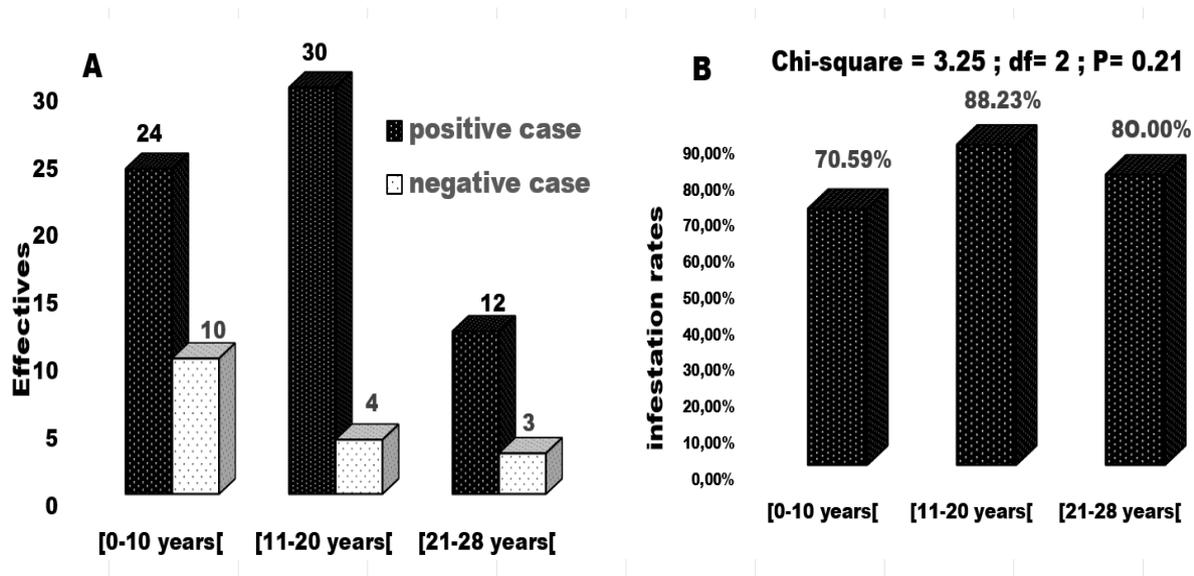
Figure 3 : : Distribution of positive and negative cases across the three age groups (A) and infestation rates of infesed individuals (B).

III-3-Distribution of prevalence in function of gender

In both genders, 27 male patients were found to be parasitized, which is 32.50 ± 10.07% of the total number of examined individuals. Meanwhile, 39 female patients were parasitized, making up 47.00 ± 10.73% of the total number of examined individuals.

Among the 66 positive samples, 27 were male, constituting 90 ± 7.86 % in male population, while 39 were female, accounting for 74 ± 9.22 % in female population. Difference between the infestation rates of different genders were statistically significant (P <0.05) (Figure 4).
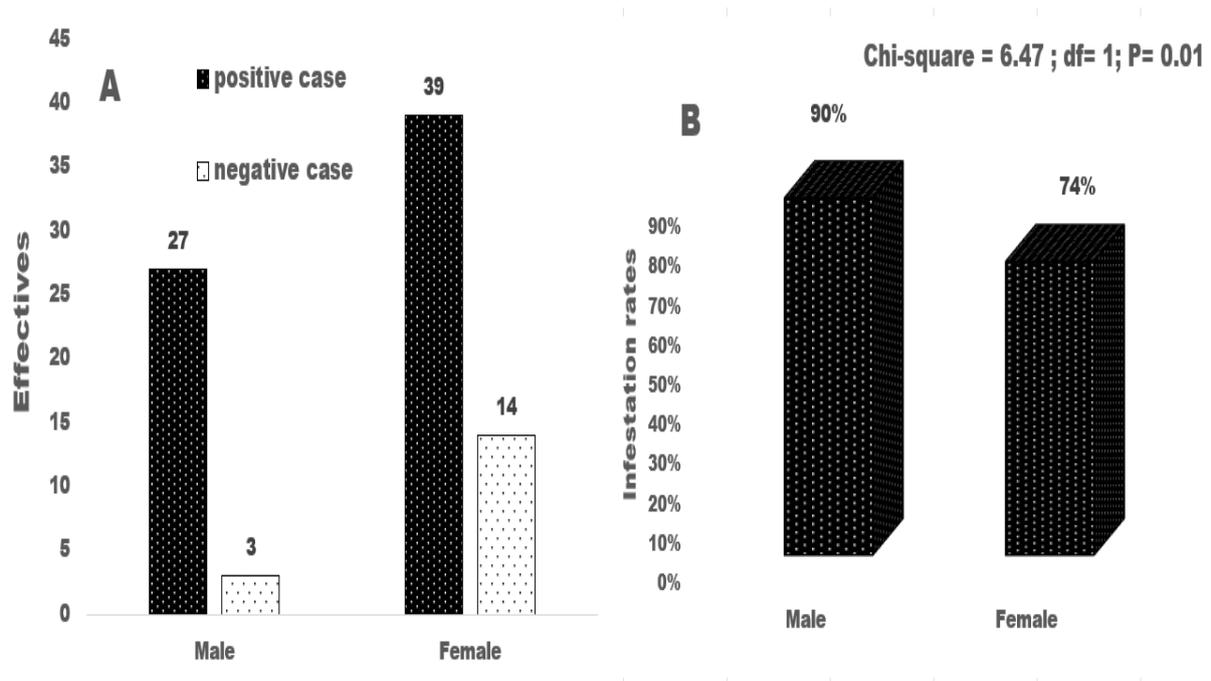
Figure 4 : Distribution of positive and negative cases with respect to the total number of males and females (A) and rates of positive cases by gender (B).

III-4-Inventory of parasites in stool samples

The list of identified parasites in stool samples and their prevalence is presentented in table I. From the data, it appears that the taxon of Nematoda was the most diversed with 6(26.08%) species out of the 23 listed, followed by the taxon of Trematoda with 5(21.74%) parasite species, then that of Amoeba and Flagellata with 3(13.04%) parasite species each, Sporozoa and Cestoda with 2(8.68%) species each. Finally, Ciliata and Microsporidia were represented by only 1(4.35%) species each. The most prevalent protozoa species were *E. histolytica* (39.76 ± 10.50 %) and *E. coli* (25.30± 9.32 %)) for species, while the less prevalent was Microspora (1% ± 2.14). Among helminths, *A. lumbricoides* (20.88± 8.60%) and *H. nana* (13.25 ± 7.23 %) were the most abundant, while *D. latum* (1.20 ± 2.14 %) and *Schistosoma* spp (1.20 ± 2.14 %) were less diagnosticated in this parasite taxon.

Table I : Inventoried parasite taxa in stool samples and their prevalence

Taxa	Parasitic species	Prevalences ni (P± SE)
Amoeba	*Entamoeba coli*	21 (25.30± 9.32 %)
	Entamoeba histolytica	33 (39.76 ± 10.50 %)
	Iodomoeba butschlii	4 (4.82 ± 4.21%)
	Strongyloides stercoralis	9 (10.84 ± 6.45%)

Nematoda	*Ascaris lumbricoides*	17(20.88± 8.60%)
	Ancylostoma duodenale	4 (4.82 ± 4.21 %)
	Trichuris trichiura	1 (1.20 ± 2.14 %)
	Enterobius vermicularis	7 (8.43 ± 5.83%)
	Trichostrongylus spp	6 (7.23± 5.49%)
Trematoda	*Schistosoma haematobium*	1 (1.20 ± 2.14 %)
	Schistosoma mansoni	3 (3.61 ± 3.67%)
	Fasciola hepatica	7 (8.43% ± 5.84)
	Schistosoma spp	1 (1.20 ± 2.14 %)
	Paragonimus spp	1 (1.2 ± 2.14%)
Cestoda	*Hymenolepis nana*	11 (13.25 ± 7.23 %)
	Diphyllobothrium latum	1 (1.20 ± 2.14%)
Ciliata	*Balantidium coli*	2 (2.41 ± 3.01 %)
Microsopridia	*Microspora*	1 (1.20 ± 2.14 %)
Flagellata	*Giardia lamblia*	7 (8% ± 15.84)
	Chilomastix mesnili	4 (4% ± 4.22)
	Trichomonas intestinalis	2 (2% ± 3.01)
Sporozoa	*Cryptosporidium spp*	9 (10% ± 6.45)
	Cyclospora cayetanensis	19 (23% ± 9.05)

ni=number of infected patients with parasite species i ; SE=standard error

III-5-Assessment of parasite associations in stool samples

Among the infected subjects, 43 (65.15 ± 11.51%) harboured at least two parasites species while 23 (34.85 ± 11.51 %) hosted only a single species. In total, eight types of parasitic associations (polyparasitism) were recorded in infested hosts and classified in decreasing frequency as follows: Diparasitism associations with 16 cases (24.24 ± 12.81%), Triparasitism associations with 12 cases (18.18 ± 11.57%), Pentaparasitism association with 6 cases (9.09 ± 8.59%),Tetraparasitism associations with 5 cases (7.57 ± 7.91%), and then Hexaparasitism, Heptaparasitism, Nonaparasitism and Picoparasitism with only 1 case (1.5% ± 3.63) each (Figure 5).
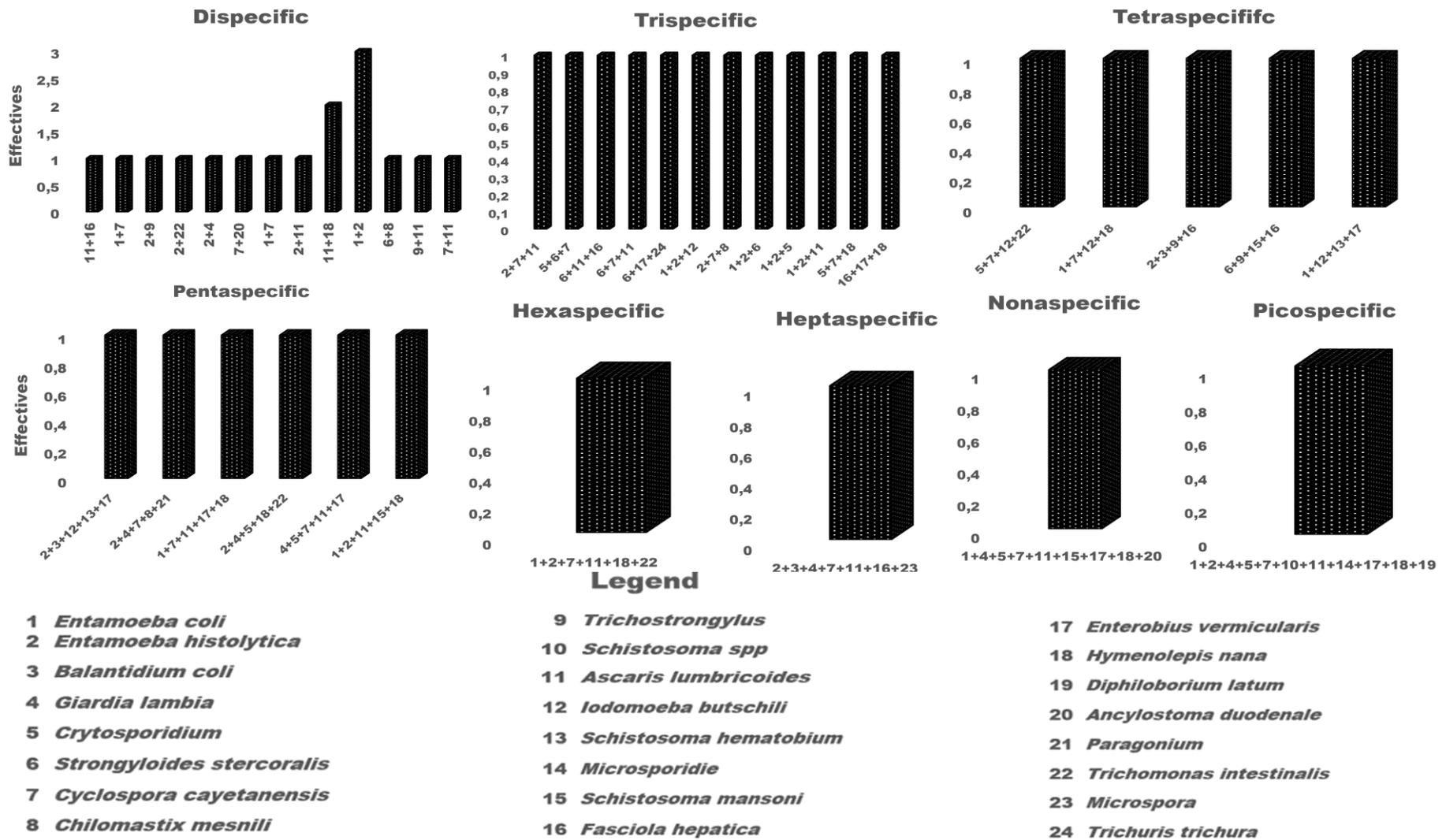
Figure 5 : Distribution of parasitic associations among the infested Partients.

III-6-Risk factors associated with the targeted intestinal parasites infections

Risk factors associated with targeted intestinal parasitic infection among examined patients are presented in table II. Results shown that 52 % of the examined patients were not regularly washing fruits and vegetables before their consumption; 33 % of them were not treating water before consumption; 20 % were not regaluray washing hands with soap after defecation. There was a statistically significant association between the three factors listed below and targeted intestinal parasitic infection (P<0.05). Habits of hand washing before and after meals, using latrine for defecation and walking barefooted did not statistically influenced the transmission of intestinal parasites to their host (P>0.05).

Table II: Risk factors associated with targeted intestinal parasites infection among the examined stools of selected patients

Variables	Answers		Number of positive cases for each answer		Infestation rates ± Standard Error (SE) (%)		Statistiques
	Yes	No	Yes	No	Yes	No	
Regular washing of fruits and vegetables before consumption	40	43	25	41	62.50 ± 15.01	95.35 ± 6.29	χ^2= 13.72 df= 1 P= 0.0002
Treatment of water before consumption	56	27	40	26	71.43 ± 11.83	96.30 ± 7.12	χ^2= 9.42 df= 1 P= 0.008
Regular washing hands with soap after defecation	66	17	49	17	74.24 ± 10.55	100	χ^2= 5.52 df= 1 P= 0.017
Regular washing hands with soap before and after meals	53	30	43	23	81.13 ± 10.53	76.67 ± 15.13	χ^2= 0.23 df= 1 P= 0.63
Habits of using latrines for defecation.	78	5	62	4	79.49 ± 8.96	80.00 ± 35.06	χ^2= 0.0008 df= 1 P= 0.98
Walking barefooted	23	60	20	46	86.96 ± 13.76	76.67 ± 10.70	χ^2= 1.08 df= 1 P= 0.37

χ^2= Chi square ; df= degree of freedom

DISCUSSION

Findings of this study indicated that out of the 83 participants examined, 66 (80 ± 8.61%) were infected with at least one or more targeted intestinal parasite species. This high prevalence rate may be attributed to the population hosts susceptibility to the infective stages of target parasites (helminths and protozoa parasites), the omnipresence of infective parasite forms in the examined hosts living environment due to multiple factors such as inadequate sanitation, poor personal hygiene, and the consumption of contaminated drinking water and food. Such environmental and socioeconomic conditions provide ideal circumstances for parasitic establishment and transmission to sensitive hosts as the studied patients. The prevalence observed in this study is higher than those reported by Brice *et al.* (2019) in south Cameroon (42.9%), Enoka *et al.* (2022) in Bokito Centre-Cameroon (53.5%), Omgbassomben *et al.* (2021) in East Cameroon (74.9%), Kemba *et al.* (2022) in Sudanian/Sahelian zones in Chad (35.87%) ; Oyono *et al.* (2019) in Akonolinga Centre-Cameroon (74.28%), Kumurya *et al.* (2021) in Kano State, Nigeria (14,3%), Hailu & Ayele (2021) in Debre Berhan Town, North-East of Ethiopia (52.9%) and Imane *et al.* (2023) in Agadir city, Morocco (42.0%); this prevalence gap is probably due to differences in sociodemographic and environmental factors, and/or the heterogeneity of host susceptibility/exposure to parasites.

Regarding the distribution of the intestinal parasites among age groups, the highest infection rate was observed in the 11-20 years age. This pattern may be attributed to various behavioral and social factors. Adolescents and young adults in this age range, often engage in more outdoor activities, because they are less supervised by parents, and may have increased their exposure to parasites, whereas younger children are typically more closely monitored regarding hygiene due to a better parental supervision. These findings support with those of Davane *et al.* (2012), who reported highest prevalence in the 11-20 years age group but differs from those of Hailu *et al.* (2021), who found the highest infection rates among children aged 6-9 years in Debre Behran town in Northeast Ethipia. This discrepancy may be explained by differences in age-related immunity, as older individuals often have more developed immune systems, which could lead to reduce susceptibility to parasitic infections.

In terms of gender, males were found to be more infected than females, with prevalence rates of 90 ± 7.86 % and 74 0 ± 9.22 %, respectively. This finding aligns with the results of Tchinde *et al.* (2021), who reported prevalence rates of 31.76% for males and 28.15% for

females in Bafoussam II (West Cameroon). The higher prevalence in males observed in this study may be attributed to their outdoor activities, which increase exposure to contaminated soil and water, a major predisposing factors for infection. Additionally, behaviors such as consuming uncooked food and engaging in laborious tasks without proper handwashing before eating could further contribute to this trend. Conversely, Kumuryqa *et al.* (2021) reported higher prevalence rates in females (61.1.1%) compared to males (38.9%) in Kano State (Nigeria). The difference could be better explained by the fact that, in addition to household responsibilities, women in this area are involved in farming and handling of livestock, thus making them more exposed to contaminated soil and water by the targeted infective parasites forms.

Among the identified parasites in stool, protozoan were predominant with a prevalence of 61%, particularly Amoeba such as *E. histolytica* (39.75 ± 10.5%) and *Entamoeba coli* (25.30 ± 9.32%). The high prevalence of *E. histolytica* observed in this study may be attributed to favorable climatic conditions that support the survival of cysts outside the host, as well as factors such as the type of drinking water used and poor hygienic practices, including inadequate handwashing before meals. Similar results were reported by Talal *et al.* (2016) in an urban area of Taiz City, where *E. histolytica was the most frequent protozoa species*. However, this prevalence contrasts with the findings by Signaboubo *et al.* (2019), who reported a prevalence of 7.23% in Bafia, and Mbuh *et al.* (2010), who reported a protozoan prevalence of 28.1% in Buea. These numerical variations underscore to the fact that the prevalence of protozoans differs across regions, influenced by socioeconomic and environmental specificities, hosts susceptibility and/or experimental conditions.

Ascaris lumbricoides (20.88 ± 8,60%) and *H. nana* (13.25 ± 7.23%) were the main parasitic helminths identified in stool samples. The high prevalence of *A. lumbricoides* observed among intestinal helminths may be attributed to its fecal-oral transmission pathway and its epidemiology, which is strongly influenced by individual and community hygienic habits and human waste disposal method. The ova of this species are equipped with an outer coat that enables them to resist adverse external environmental conditions and enhances their survival and higher probability of transmission. These findings align with those of Oyono *et al.* (2019) and Oyono (2020), who reported a prevalence rate of 21.4% in Akonolinga (Centre Cameroon), and Kemba *et al.* (2022) in Sudanian/Sahelian zones in Chad (16.4%) for *A. lumbricoides*. The prevalence of *A. lumbricoides* observed in this study is higher than that reported by Khan *et al.* (2017) in the West Region of Cameroon (4.4%) and M'Bondoukwé *et al.* (2018) in Gabon

(13.7%). However, these findings are lower than those reported by Kimbi *et al.* (2012) in the South West Region of Cameroon (30.21%) and Ruto & Mulambalah (2016) in Kenya (55.8%). These numerical differences underscore the fact that the prevalence of this species differs across regions, including the heterogeneity for hosts susceptibility/exposure to target parasites and/or the heterogeneity of environmental/experimental conditions.

From our findings, infected individuals were most polyparasitized (65.15 ± 11.5%) ; supporting the statement that the polyparasitism seems to be the usual pattern in the host populations, especially in endemic areas where the infective parasite form distributions overlapping (Oyono *et al.* 2019 ; Ongbassomben *et al.*, 2021 ; Bilong Bilong *et al.*, 2021 ; Kemba *et al.*, 2022).

The analysis of risk factors related to the transmission of intestinal parasites revealed that transmission of such pathogens are linked to poor hygiene practices. Regular washing of fruits and vegetables before consumption, regular hand washing with soap after defecation and water treatment before consumption have been shown to be practices that aim to significantly reduce infestation rate within host population. This result corroborates those of Natchema *et al.* (2020) and Ongbassomben *et al.* (2021), who highlighted that, failure to comply with hygiene rules constitutes a significant risk factor for the spread of intestinal parasites in a given environment. This finding needed to take into consideration in the national program strategy against the targeted parasites to significantly reduce the transmission of these pathogens in the studied population.

CONCLUSION

This study identified diversity and prevalence of intestinal parasites among residents of the District of Efoulan. The parasitic fauna of helminths and protozoa was diversified ; 23 species were inventoried, and subdivided into eight (8) parasite taxa : Nematoda (6 species), Trematoda (5 species), Amoeba and Flagellata (3 species each), Sporozoa and Cestoda (2 species each) and Ciliata and Microsporidia (1 species each). The most prevalent protozoa species were *E. histolytica*, while the less prevalent was Microspora. The overall prevalence of IPI infection was 80.00 ± 8.61%. It revealed that patients aged 11-20 years exhibited the highest infestation rate (88.23 ± 10.83 %). The males were most infested than females. *The majority (65.15 ± 11.51%) of the infected patients harboured at least two intestinal targeted parasite species (polyparasitism), with diparasitism being the common parasitic association (24.24 ± 12.81%).* Non-compliance with hygiene rules, and the consumption of non potable water significantly favored the infestation of hosts in the study environment.

These findings emphasize the need for improved sanitation and community education to mitigate infection risks and reduce the prevalence of intestinal parasitic infections in the Efoulan District.

RECOMMENDATION

To the Ministry of Public Health

- Implement regular chemotherapy programs in the study area to reduce the burden of parasitic infections ;

- Develop and promote hygiene education programs within schools to raise awareness among children and families about sanitation and hygiene practices ;

- Establish routine health screening programs in schools and communities to identify and treat parasitic infections early, with a focus on vulnerable groups.

To the Population

- Participate in community awareness campaigns to learn about the transmission, prevention, and treatment of intestinal parasitic infections.

- Practice good hygiene and sanitation habits to reduce exposure to and the spread of parasitic infections.

- Use treated or boiled water for drinking to minimize the risk of parasitic infections.

Conflict of interest

The authors declare that there is no conflict of interests.

Authors' contribution

Conception and design of the study: **AJEAGAH GIDEON Aghaindum, KOGA Mang'Dobara, MAMBOUNE Sylvie Martine**; Contribution of material and reagents: **AJEAGAH GIDEON Aghaindum, KOGA Mang'Dobara**; Survey, samples collection and stool analysis: **MAMBOUNE Sylvie Martine**; Data analysis: **PIERROU Maxime, MAHOB Raymond Joseph**; Revising the article critically for important intellectual content: **MAHOB Raymond Joseph, AJEAGAH GIDEON Aghaindum**.

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