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Prevalence of Gastro-intestinal Parasitic Infections among Patients in Bafia Health District, Center Region Cameroon: A Retrospective Study

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Authors' contributions

This work was carried out in collaboration among all authors. Authors DS, YC, VKP, IMAM and MM designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors NGR, EKN and LM managed the analyses of the study. Authors EKN and LM managed the literature searches. All authors read and approved the final manuscript.

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Original Research Article

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ABSTRACT

Aims: The aim of this study was to assess the prevalence of gastrointestinal parasitic infections among patients consulting at the Laboratory of Biomedical Analysis of the District Hospital in Bafia, Catholic Health Center of Gondon and Sub-Divisional Medical Centers of Bokito and Ombessa.
Study Design: The retrospective study conducted covered available data from January 2007 to December 2014. Records of patients referred to the Laboratory of these Health Centers were manually reviewed for gastrointestinal infections. Data were recorded according to age, occupation, sex and marital status of patients and the type of parasite involved, and analyzed using the Statistical Package for Social Science (SPSS 17.0).

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Results and Discussion: A total of 35 587 stool samples were analyzed using the direct examination method between January 2007 and December 2014. For the past eight years, 3 species of protozoan and 7 species of helminths were identified with a prevalence of 07.23% and 15.7% respectively and an overall prevalence of 22.83%. Protozoans as *Entamoeba histolytica* (22.27%), *Giardia lamblia* (4.97%) and *Cryptosporidium* spp (1.23%) as well as helminthes as *Ascaris* spp (24.1%), *Schistosoma* spp (16.17%), Hookworm (11.55%), *Taenia* spp (11.55%), *Trichiuris trichura* (7.06%), *Strongyloides stercoralis* (2.12%) and *Enterobius vermicuralis* (0.59%) were recorded.
Conclusion: From these results, both preventive and curative campaigns should be encouraged and intensified in the study area so that the scourge of gastro-intestinal infection should no longer be an issue of public health importance.

Keywords: Retrospective; gastro-intestinal; parasitic infections; prevalence; Bafia; Cameroon.

1. INTRODUCTION

Intestinal parasitic infections are a public health problem and among the most common infections worldwide. It is estimated that some 3.5 billion people are affected, and 450 million are ill as a result of these infections [1]. Current estimates show that at least more than one-quarter of the world's population is chronically infected with intestinal parasites and that most of these infected people live in developing countries [2,3].

Intestinal parasitic infections, as in several developing countries, are common in Cameroon and cause serious public health problems such as malnutrition, poor school attendance, anaemia, growth retardation, morbidity and mortality as well as higher susceptibility to other infections. Furthermore, low socio-economic standards, poor personal and environmental sanitation and ignorance of simple health promotion practices favour the wide distribution of these infections in Cameroon.

It is estimated that half the population of Cameroon is infected with gastro-intestinal parasites and the prevalence varies from one Region to another depending on economic, social and environmental factors [4]. To the best of our knowledge, no studies have been done on gastro-intestinal parasites in the Mbam-et-Inoubou Sub-Division of the Center Region of Cameroon.

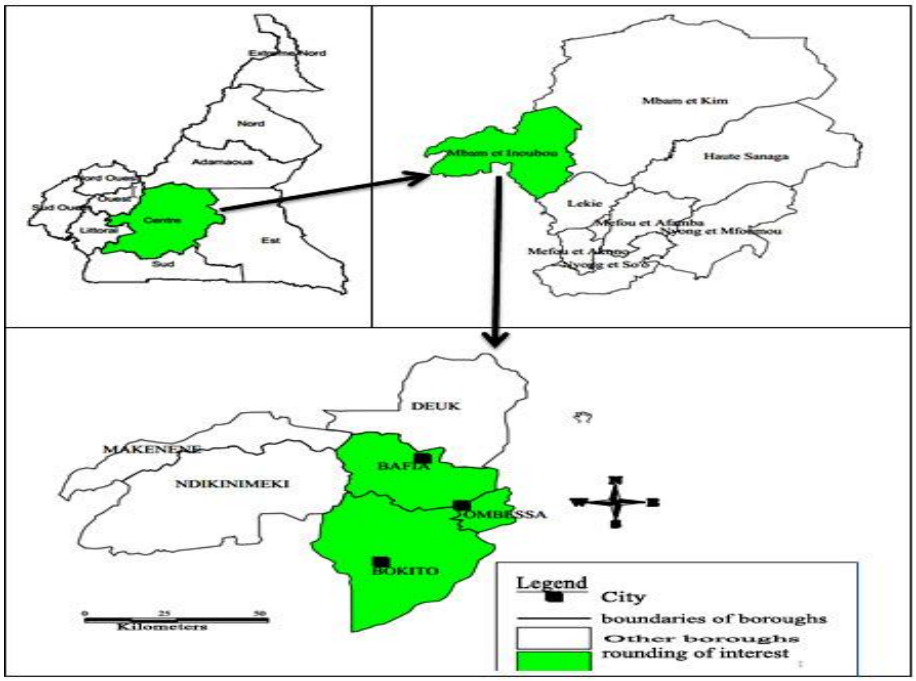

Fig. 1. Location of study area (administrative map)

According to Ekpenyong et al. [5] and Mohammad et al. [6] on the epidemiology favouring the evolution of gastrointestinal infections, the study area falls on these factors and therefore justify the aim of this study among patients consulting in the different hospital of the Mbam-et-Inoubou Sub-Division. The aim of this study was to assess the prevalence of gastro-intestinal parasitic infections among patients consulting at the Laboratory of Biomedical Analysis of the District Hospital in Bafia, Catholic Health Center of Gondon and Sub-Divisional Medical Centers of Bokito and Ombessa.

2. METHODOLOGY

2.1 The Study Area

This study was carried out in the Bafia Health District in Mbam-et-Inoubou Sub-Division in the Center Region of Cameroon as presented in the map below.

2.2 Collection and Data Analysis

Hospital records recorded from outpatients in the District Hospital (HD) of Bafia, Catholic Health Center (CHC) of Gondon and Sub-divisional Medical Centers (CMA) of Bokito and Ombessa for the past 08 years between January 2007 and December 2014. Specimens were carefully examined by medical laboratory technicians for the presence of parasites and/or their respective stages (cysts, trophozoites, ova and larvae). The stool specimens were examined using direct examination. The age, occupation, sex and marital status information of the patients were recorded using questionnaires.

Data were analyzed using Statistical Package for Social Science (SPSS). The Duncan Test at 5% of ANOVA two ways was used to compare prevalence.

3. RESULTS

Between January 2007 and December 2014, 39678 samples were analyzed, 4091 samples had incomplete information thus were not used in this study. Of the 35587 samples remaining, 8124 were infected with an overall prevalence of 22.83% (7.23% of protozoans and 15.7% of helminths). The Figs. 2, 3, 4, 5, 6, 7 and 8 show respectively the general prevalence of each type of parasite (protozoan and helminths) found in stools, prevalence according to age, occupations, gender, marital status and the trend of gastro-intestinal infections within the last eight years.

Table 1 shows the number and percentage (%) of co-infections diagnosed in District Hospital of Bafia (HD Bafia), Catholic Health Center of Gondon (CHC Gondon) and Sub-divisional Medical Centers of Bokito (CMA Bokito) and Medical Centers of Ombessa (CMA Ombessa). It follows from the analysis of this Table 1 that the highest co-infection was in the Catholic Health Center of Gondon (85.71).

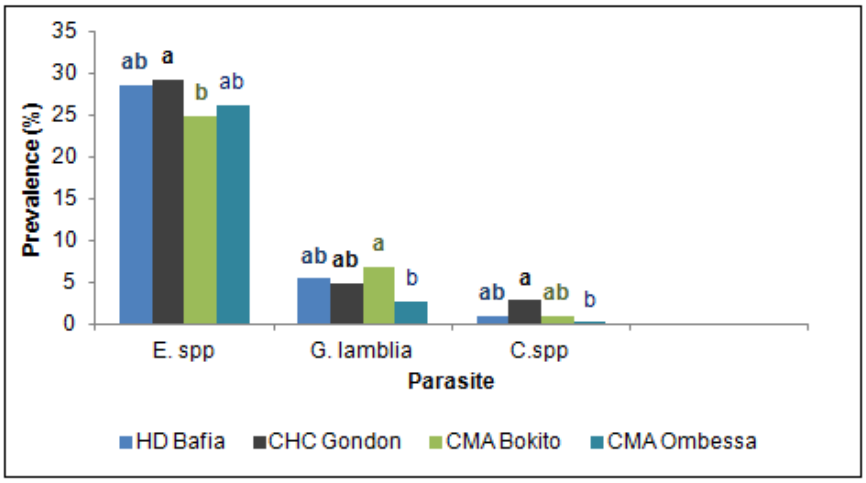

Fig. 2. Prevalence of protozoans diagnosed in the District Hospital of Bafia (HD Bafia), Catholic Health Center of Gondon (CHC Gondon) and sub-divisional Medical Centers of Bokito (CMA Bokito) and Medical Centers of Ombessa (CMA Ombessa)

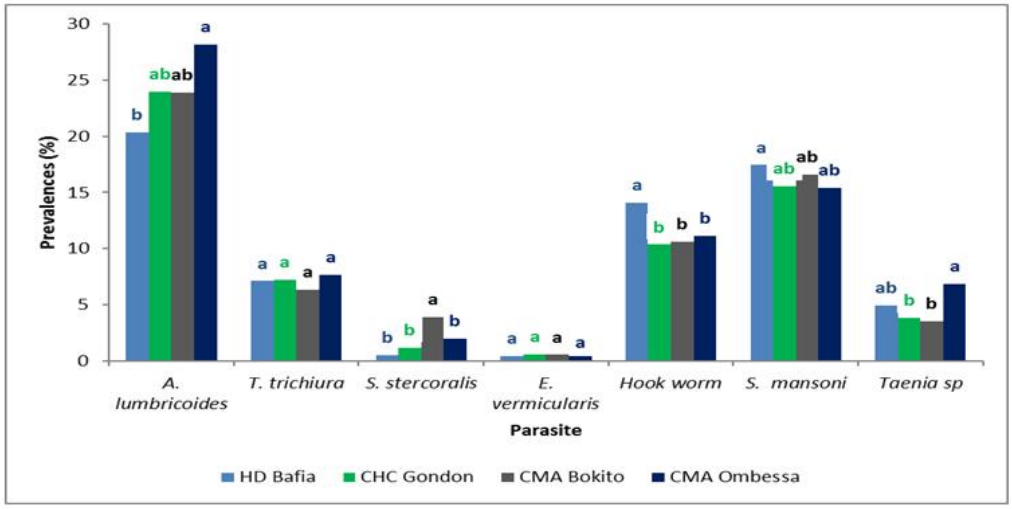

Fig. 3. Prevalence of helminths diagnosed in the district hospital of Bafia (HD Bafia), Catholic Health Center of Gondon (CHC Gondon) and sub-divisional Medical Centers of Bokito (CMA Bokito) and Medical Centers of Ombessa (CMA Ombessa)

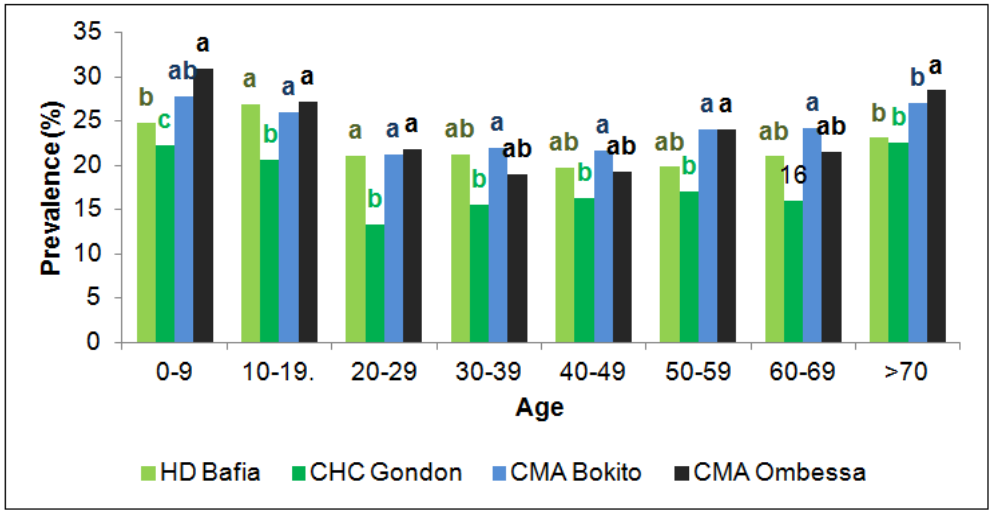

Fig. 4. Distribution of gastro-intestinal prevalence by age in the district hospital of Bafia (HD Bafia), Catholic Health Center of Gondon (CHC Gondon) and Sub-Divisional Medical Centers of Bokito (CMA Bokito) and Medical Centers of Ombessa (CMA Ombessa)

Table 1. Number and percentage (%) of co-infections diagnosed in the District Hospital of Bafia (HD Bafia), Catholic Health Center of Gondon (CHC Gondon) and Sub-divisional Medical Centers of Bokito (CMA Bokito) and Medical Centers of Ombessa (CMA Ombessa)

Co-infection	Bafia HD		CHC of Gondon		CMA of Bokito		CMA of Ombessa	
	N	%	N	%	N	%	N	%
Entamoeba sp +*A. lumbricoides*	9	52.95	12	85.71	7	63.63	8	53.33
Entamoeba sp + *Schistosoma sp*	6	35.29	-	-	-	-	3	20
A. lumbricoides + Ankylostoma	2	11.76	2	14.29	3	27.26	1	6.66
Schistosoma spp + Ankylostoma	-	-	-	-	1	9.09	-	-
Entamoeba sp + Ankylostoma	-	-	-	-	-	-	3	20
Total	**17**		**14**		**11**		**15**	

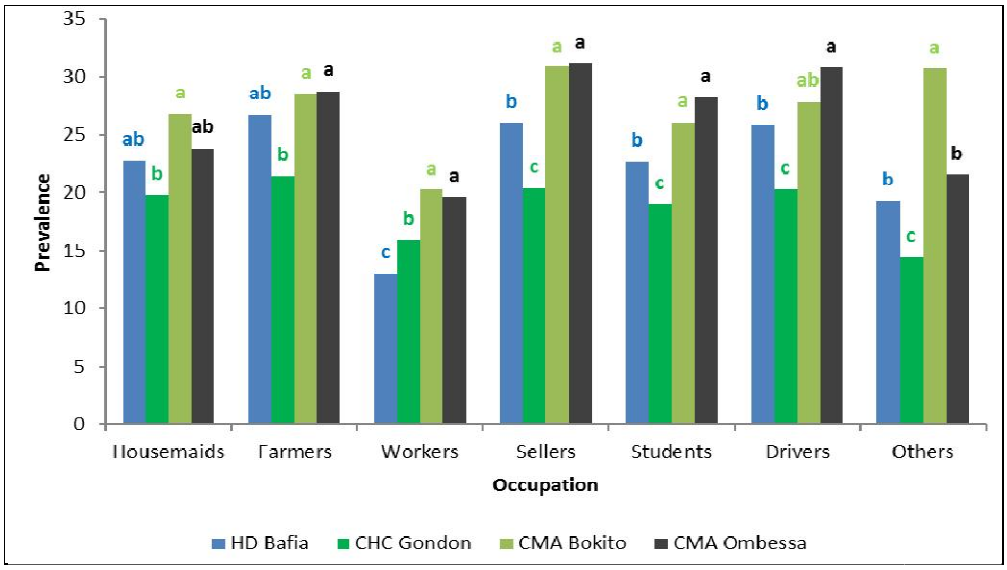

Fig. 5. Distribution of gastro-intestinal prevalence by occupation in the District Hospital of Bafia (HD Bafia), Catholic Health Center of Gondon (CHC Gondon) and Sub-divisional Medical Centers of Bokito (CMA Bokito) and Medical Centers of Ombessa (CMA Ombessa)

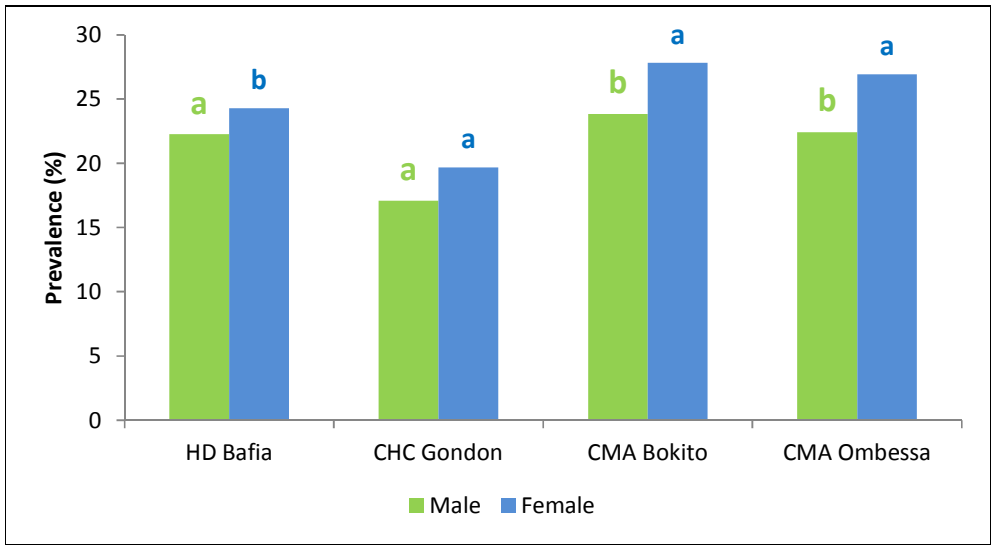

Fig. 6. Distribution of gastro-intestinal Prevalence by gender in the District Hospital of Bafia (HD Bafia), Catholic Health Center of Gondon (CHC Gondon) and Sub-Divisional Medical Centers of Bokito (CMA Bokito) and Medical Centers of Ombessa (CMA Ombessa)

4. DISCUSSION

In the present study, we observed an overall prevalence of gastro-intestinal infections (22.83%) in Mbam-et-Inoubou during the last 08 years (2007-2014). The prevalence of the different parasites we observed is in line with those of *Chala* [7] in Ethiopia (10.8%).

The prevalence of helminths (15.6%) was very low compared to that (50 %) reported by MINSANTE [4] who observed different trends of infectivity for those geohelminths where *A. lumbricoides* and Hookworms had a high prevalence in Mwanza (Tanzania) [8], Ogun State (Nigeria) [9] and N'djamena (Chad) [10]. A possible explanation is that epidemiological studies on the prevalence of infection of intestinal

parasites differ by region, within countries, and even within country, this largely depends on the local environmental conditions. However, such comparisons between study areas must be interpreted very conservatively, given the multitude of factors(for example the distribution of infections varies with altitude, probably as a result of the effects of temperature, humidity and ultra-violet light on the survival of worm eggs and larvae) leading to dramatic differences in prevalence of geohelminth infections.

The prevalence of protozoan infection in this study was 7.23%, While Mbuh et al. [11] reported a prevalence of 28.1 % for protozoans in Buea. This high prevalence of protozoans in Buea shows that prevalence varies from one Region to another depending on socioeconomic and environmental specificities. The identification of parasites shows that there is a great diversity of gastrointestinal parasites in Bafia. Thus, *Entamoeba* spp. was the most common of protozoans while *Ascaris* spp., Hookworms and *Schistosoma* spp were the most common helminths. Similar results were reported in Buea [11], Simok [12] and Dschang [13] in Cameroon, where *Entamoeba histolytica* and *E. coli* were most frequent.

The high prevalence of *Entamoeba spp* and *Ascaris spp* was due to the presence of cyst (in the case of *Entamoeba spp*) and eggs (in the case of *Ascaris spp*) of these parasites in the study area. A possible explanation is that they are transmitted to the population by drinking water and food whereas infection by *Schistosoma spp* was due to the presence of furcocercaeses in dirty water which was transmitted to people when they swim or are in contact with water. These infections are among the common intestinal parasitic infections worldwide and are closely related to socio-economic status, poor sanitation, inadequate medical care and absence of safe drinking water [7]. On the other hand, *Enterobius vermicularis* was a rare helminth parasite. This parasite is usually common in children because of their particular life cycle. It lays eggs in the perineum surface and thus the diagnostic required the scotch test, unfortunately, this test is not used in the Health Centre of the study area.

Poly-parasitism constituted exclusively of double infection, especially *Entamoeba spp* and *Ascaris spp*. This must be due to the high presence of *Ascaris spp* and *Entamoeba spp* in the study area, the similarity on the route of transmission and the absence of competition in the digestive tract. Furthermore, in Douala poly-infection was constituted of *A. lumbricoides* and *T. Trichiura* [14].

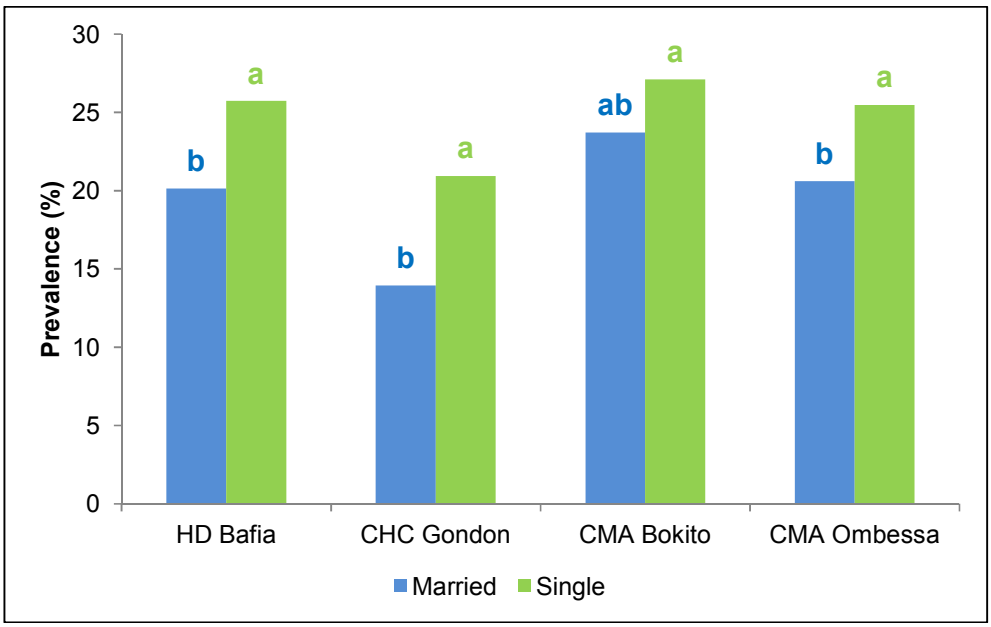

Fig. 7. Distribution of gastro-intestinal prevalences by age in the District Hospital of Bafia (HD Bafia), Catholic Health Center of Gondon (CHC Gondon) and Sub-divisional Medical Centers of Bokito (CMA Bokito) and Medical Centers of Ombessa (CMA Ombessa)

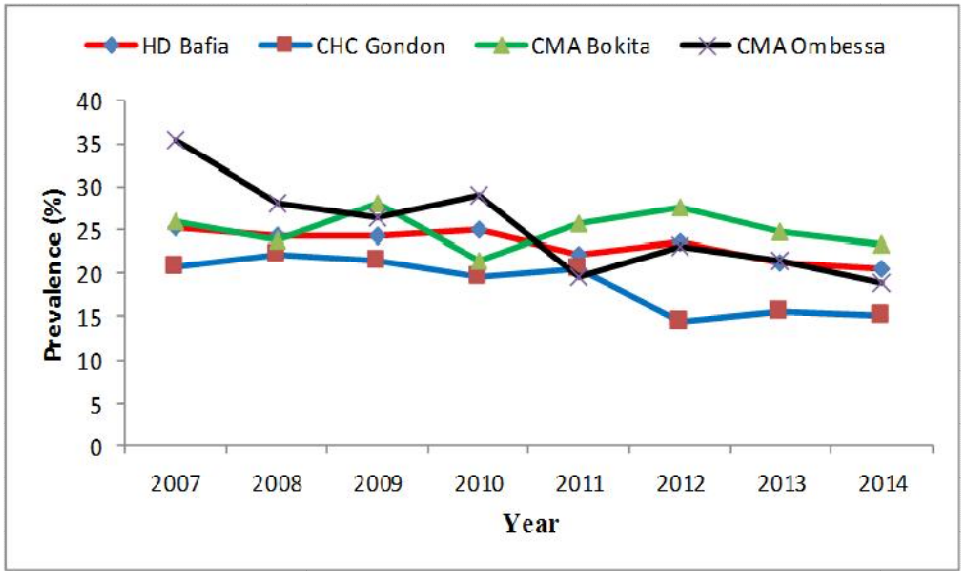

Fig. 8. General evolution of the epidemiological situation of gastrointestinal infection in the District Hospital of Bafia (HD Bafia), Catholic Health Center of Gondon (CHC Gondon) and Sub-divisional Medical Centers of Bokito (CMA Bokito) and Medical Centers of Ombessa (CMA Ombessa)

Prevalence according to age shows that patients aged between 0 to 19 years old and those of more than 70 years old were the most infected. These results can be explained by the fact that children were infected by playing around infected areas and the non-respect of food hygiene [15]. Thus, the incompetent immune system of young children can play an important role in infection. However, the high prevalence recorded in people above 70 years could be attributed to malnutrition, under nutrition which lead to a decline in the immune system hence exposed them to a high risk of infections.

The high prevalence in farmers may be explained by the hygienic practices not yet well respected by these farmers despite the different major precautions put in place by the national program for schistosomiasis and intestinal helminthiases. Thus WHO [1] reported that geohelminths and protozoans were most diagnosed in agricultural sectors due to the constant use of organic fertilizers which resulted in their contamination with soil. Therefore, the precarious nature of hygiene conditions and poverty in the farmer's milieu can justify this high prevalence [16,17,18]. The high prevalence recorded in sellers and drivers may be attributed to their careless, nonchalant attitude of eating along the roadside more often with unwashed or properly washed hands.

These results also show that people were mostly infected in rural than urban milieu (Bafia). Similar results were reported in Buea [11]. This situation can be attributed to accentuated poverty, lack of sanitation in villages and perhaps health facilities, a situation which is different in urban areas where many houses have potable good drinking water, health facilities, social interaction which reduces the risk of contamination. Therefore the incidence of infection is intimately linked to socio-economic status. The lowest prevalence reported in Catholic Health Center of Gondon could be due to a better economic situation of the people.

The prevalence of intestinal parasitic infections was generally higher in female than male. The WHO reported that the prevalence of gastro-intestinal infection varies according to gender and this is related to variation and diversity of occupation of men and women in the society, which may also differ according to ethnic groups [1]. Generally, in Bafia women were mostly engaged in farming which involves the use of organic matter in agriculture and consequently leading to contamination by soil parasites. Similar results were reported in Ethiopia [19] and in Nigeria [20]. Mbuh et al. [11] reported that in Cameroon women usually eat fruits and vegetables without washing, this may justify the high infection observed in women.

Singles were the most infected than married people. This is perhaps due to the fact that most singles are young and coupled with youthful exuberance are, therefore, exposed to risks of infection. Infants were infected while playing with infected soil which contains the infected forms of geohelminths and the non-respect of alimentary hygiene [7].

The annual prevalence of gastrointestinal infection dropped between 2007 and 2014 in Bafia Health District. Similar results were reported in Guatemala between 2004 and 2007 [21]. This "positive" situation may be due to many factors including awareness increased respect for hygiene and sanitation, sensitisation of the public and distribution of anthelminthic by the National Program on the control of Schistosomiasis and Intestinal Helminth (NPSIH) as well as the automedication of the population. Also, the efficacy of the increasing medicinal plants used in traditional medicine is more and more reported by many authors. WHO/UNICEF [22] reported that, in Cameroon, enormous efforts had been made to access medical care and safe water. It was estimated in 2012 that, about 75% of the Cameroonian population had access to potable drinking water while 45% received good medical care. This may have contributed to the reduction of gastro-intestinal infections in Cameroon.

5. CONCLUSION

Intestinal parasitic infections, as in several developing countries, were common in Cameroon and cause serious public health problems such as malnutrition, poor school attendance, anaemia, growth retardation, morbidity and mortality as well as higher susceptibility to other infections.

SIGNIFICANCE STATEMENT

This study discover the number and percentage (%) of co-infections diagnosed in the District Hospital of Bafia (HD Bafia), Catholic Health Center of Gondon (CHC Gondon) and Sub-divisional Medical Centers of Bokito (CMA Bokito) and Medical Centers of Ombessa (CMA Ombessa) that can be beneficial for the WHO in the control of gastrointestinal parasites. This study will help the researcher to uncover the critical areas of neglected tropical diseases that many researchers were not able to explore. Thus a new theory on the control of neglected tropical diseases may be arrived at.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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