Open Journal of Public Health

Research Article
Published: 19 Oct, 2020

Prevalence and Risk Factors of Geohelminths in Ntamuchie, Mezam Division, North West Region, Cameroon

Yamssi Cedric[1], Noumedem Anangmo Christelle Nadia[2], Calvin Bisong Ebai[3], Flore Nguemaim Ngoufo[1], Gerald Ngo Teke[1], Joyceline Dulafe[3], Tangwah Louisa Bihnyuy[3], Vincent Khan Payne[4] and Helen Kuokuo Kimbi[1]*

[1]*Department of Biomedical Sciences, University of Bamenda, Cameroon*

[2]*Department of Microbiology, Hematology and Immunology, University of Dschang, Cameroon*

[3]*Department of Medical Laboratory Science, University of Bamenda, Cameroon*

[4]*Department of Animal Biology, University of Dschang, Cameroon*

Abstract

Background: Parasitic infections remain a major public health problem worldwide, particularly in developing countries. The present study was aimed at determining the prevalence and risk factors associated with geohelminths in persons living in Ntamuchie community.

Methods: A cross sectional study was carried out in the months of May and June, 2020 on 100 inhabitants of the Ntamuchie community. A questionnaire was administered to people who accepted to sign the consent form. The formalin-ether concentration technique was used to concentrate the parasites for identification under the microscope.

Result: From a total of 100 stool samples analyzed 35 were infected with at least one species of parasitic geohelminths (35.0%) and 65 (65.0%) of the stool samples were negative. Five different helminths were seen, and the most frequently observed were Hookworm and *Ascaris* species, showing a prevalence of 17% each. The age group 0 to 14 years had the highest prevalence (19%) of helminthic infections while the Age group ≥ 15 years had a prevalence of 14%. Those who accomplished just the primary level of education had the highest occurrence of helminthic infections with a prevalence of 20%, followed by those of secondary education with a prevalence of 10% and lastly those of tertiary education 5%. Respondents who used pit toilets had the highest occurrence of geohelminths with a prevalence of 31% while those using the water system demonstrated a prevalence of 4%.

Conclusion: This study shows that the community of Ntamuchie is highly infected with geohelminthic parasites. Improvement of sanitation, health education to promote awareness about health and hygiene together with periodic mass deworming are advocated as better strategies to control these infections.

Keywords: Helminths; Ntamuchie; Hookworms; Prevalence; Mezam

Introduction

Soil-transmitted helminthiasis is a major public health problem in low and middle-income countries affecting about 2 billion people across the globe [1]. Schistosomiasis and other soil-transmitted helminths make up over 40% of the illnesses caused by all tropical diseases morbidity, mortality, growth retardation and poor mental development in children [2]. Furthermore, helminthic infected individuals could be susceptible to other infections such as malaria and HIV [3]. Prevention of intestinal parasitic infection usually involves the treatment of cases with appropriate drugs. In most African countries where soil-transmitted helminthic infections are endemic, the World Health Organization (WHO) recommends regular deworming of school-age children with anti-helminthic drugs to control infection by these parasites [3]. However, infection with these parasites still remains a major public health problem in most endemic areas due to re-infection [4]. Thus, there is absolute need to undertake integrated control strategies that involve improved sanitation, health education and chemotherapy to effectively control such intestinal parasitic infections in endemic African countries [5]. This requires an understanding of knowledge of the target communities about

OPEN ACCESS

Correspondence:
Yamssi Cedric, Department of Biomedical Sciences, University of Bamenda, PO Box 39, Bambili, Cameroon, Tel: (237) 677413547; E-mail: cyamssi@yahoo.com

Received Date: *02 Sep 2020*
Accepted Date*: 12 Oct 2020*
Published Date*: 19 Oct 2020*

Citation:
Cedric Y, Christelle Nadia NA, Ebai CB, Ngoufo FN, Teke GN, Dulafe J. Prevalence and Risk Factors of Geohelminths in Ntamuchie, Mezam Division, North West Region, Cameroon. Open J Public Health. 2020; 2(2): 1015.

intestinal parasites. For example, people in Uganda were interested in receiving treatment for schistosomiasis after they were informed about the benefits of the treatment [6]. Soil transmitted helminths fall among the list of eleven Neglected Tropical Diseases (NTDs) known to exist in Cameroon [6]. Although IPIs are considered to occur predominantly in rural areas, they may also develop in every setting where residents have poor access to sanitation and hygiene conditions. Such environmental conditions are found in most African rural areas. Like other tropical and sub-tropical developing countries, intestinal parasites are widely distributed in Cameroon [7]. In Cameroon, intestinal parasitic infection is a major public health problem throughout the country [7]. This is aggravated more so by the hot and humid climate, poverty, malnutrition, high population density, and poor health. Factors which may influence infection with these worms are socio-economic, cultural, physiological and behavioral with illiteracy. Multiple parameters earlier mentioned coupled with bad governance influence infection with these worms [8]. There is an urgent need to ascertain the knowledge of affected communities regarding intestinal parasites to choose the best strategy for prevention which is acceptable and effective in local settings. Thus, this study was conducted to assess the prevalence and risk factors of geo-helminths among persons living in Ntamuchie mile three Nkwen in the Bamenda III subdivision in order to update existing data and information on the epidemiology of helminths in Cameroon, and make recommendations for further regional and nationwide control programs.

Material and Methods

Study site

This study was carried out in Ntamuchie community. Ntamuchie is found in Bamenda III, Mezam Division, and North West Region of Cameroon (Figure 1). It is a semi urban area in Bamenda. Bamenda is the chief town of the North West Region which is a multicultural and metropolitan town whose inhabitants are engaged in various socioeconomic activities. The town has both government and private hospitals taking care of over 650 360 inhabitants and other villages around its localities [9].

Study design

This study was a cross sectional and random study. The study subjects were persons living in Ntahmuchie community.

Study period

This study was carried out between the months of May and June, 2020.

Inclusion criteria

All those who signed the informed consent form and children whose parents signed for them.

Exclusion criteria

All those who refused to sign the consent form.

Sample size determination

The sample size was calculated using the Cochran formula (Cochran 2008) at 95% confidence interval:

$$n = z^2p(1-P)/d^2$$

Where,

n= required sample size; z = confidence level at 95% (standard value of 1.96); p = estimated prevalence of the infection under investigation

Hence a total of 174 people in Ntamuchie community in Bamenda III were supposed to be sampled. Due to the corona virus outbreak we work only on 100 persons.

Data collection

A structured questionnaire was used to collect data on socio-demographic and risk factors of intestinal protozoans. Such data included age, sex, profession and level of education. Factors such as source of water bodies and type of toilet used in the locality that influenced the prevalence of gastrointestinal protozoans were asked. Questionnaires were administered in English and exceptionally in oral Pidgin English where necessary.

Sample collection and laboratory analysis of stool samples

Labeled cleaned proof containers were given to participants for collection of stool samples. These stool samples were observed microscopically using the Willis simple floatation method [10]. Because the solution used had a specific gravity of 1.20, the eggs of parasites rose to the top of the saturated solution (sodium chloride solution) and this was due to the difference in weight between cysts, eggs and the larvae of parasites.

Data analysis

Prevalence of intestinal protozoan was calculated as the proportion of positive samples. Data collected from the field was presented using descriptive statistics. Data was entered into Microsoft excel and analyzed.

Results

Figure 2 shows the overall prevalence of infection obtained in the study area. It appears from this study that from a total of 100 stool samples collected and analyzed from 100 study participants, 35 were infected with at least one species of parasitic geohelminths making an overall prevalence of 35.0%. Figure 3 presents the prevalence of single geohelminths infections. It follows from the analysis of this figure that, out of the 100 samples examined for parasitic geo-helminths, the following helminths were seen, *Trichuris trichiura* 5%, Hookworm and *Ascaris* sp, 17%, *Enteribius vermicularis* and *Toxocara cartis*

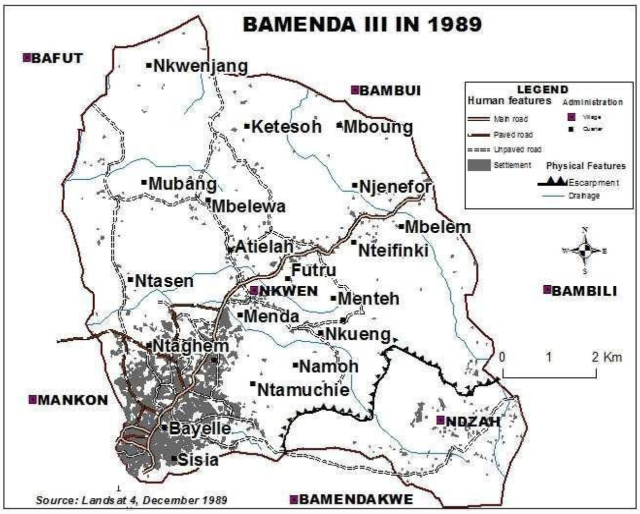

Figure 1: Peri urban land situation of Bamenda III with Ntahmuche in the map [9].

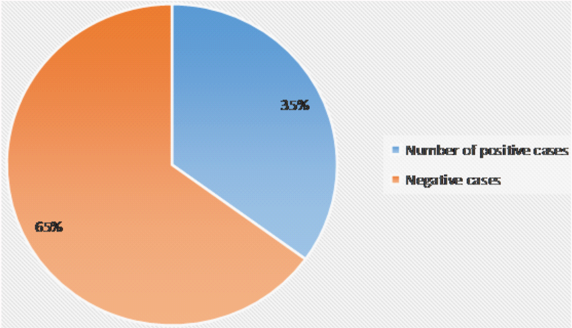

Figure 2: Overall prevalence of parasitic geo-helminths.

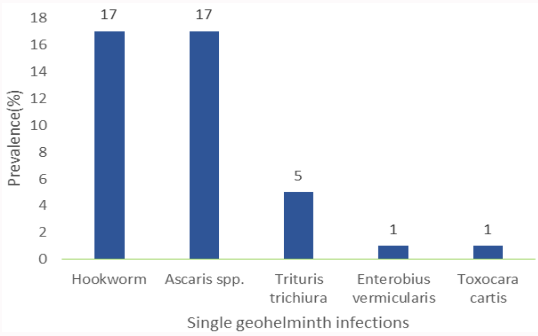

Figure 3: Prevalence of Single geo-helminths infections.

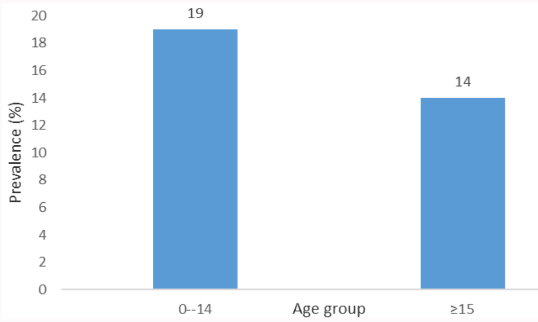

Figure 4: Prevalence of geo-helminths with respect to age group.

Table 1: Prevalence of geo-helminths with respect to sex.

Helminths	Sex	
	Male (%)	Female (%)
Hookworm	3	14
Ascaris lumbricoides	8	10
Trichuris trichiura	2	3
Enterobius vermicularis	0	1
Toxocara cartis	0	1

1% respectively. Table 1 shows the prevalence of geohelminths with respect to sex. It follows from the analysis of this figure that the highest trend of infections occurred in females with hookworm showing the highest prevalence of 14%, *Ascaris lumbricoides* showed a prevalence of 10%, followed by *Trichuris trichiura* with a prevalence of 3% and the least occurred species among the female gender was the *Enterobius vermicularis* and *Toxocara cartis* with prevalence of 1% each. While in males *Ascaris lumbricoides* demonstrated the highest level of infection with a prevalence of 8%, followed by hookworms

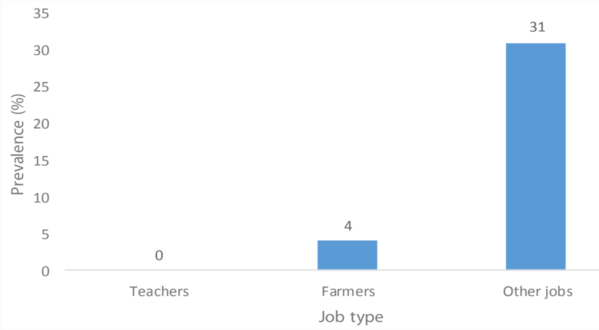

Figure 5: Prevalence of geohelminths with respect to Job type.

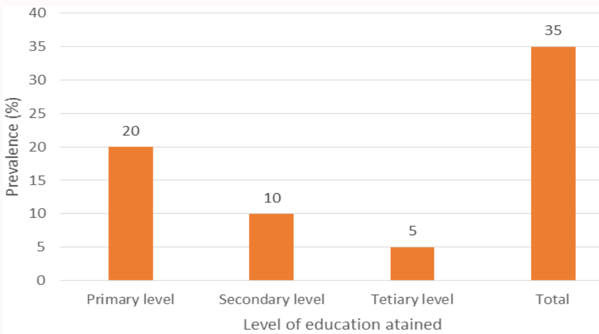

Figure 6: Prevalence of parasitic geo-helminths based on the level of education.

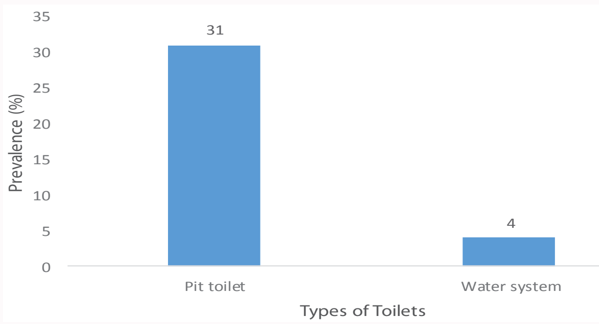

Figure 7: Prevalence of geo-helminths with respect to toilet type used.

with a prevalence of 3%, *Trichuris trichiura* with a prevalence of 2% while *Enterobius vermicularis* and *Toxocara cartis* were at 0% among Males. Figure 4 shows the prevalence of geo-helminths with respect to age group. According to this figure, the age group 0 to 14 years had the highest level of helminthic infections (19%). The second Age group ≥ 15 years had a prevalence of 14%. The frequency of parasitic geo-helminths based on profession is presented in Figure 5. From analysis of this figure professions that were not specified showed the highest parasitic helminthic infection with a prevalence of 31%. No infection was recorded amongst teachers while Farmers instead had a 4% level of geohelminthic infections. Figure 6 shows the prevalence of helminths according to level of education. In relation to education, findings shows that, persons with primary level of education had the highest occurrence of helminthic infections with a prevalence of 20%, followed by those with secondary education with a prevalence of 10% and lastly those with tertiary education 5%. Figure 7 presents the frequency of parasitic geo-helminths with respect to type of toilet used. From this figure respondents who used pit toilet had the highest

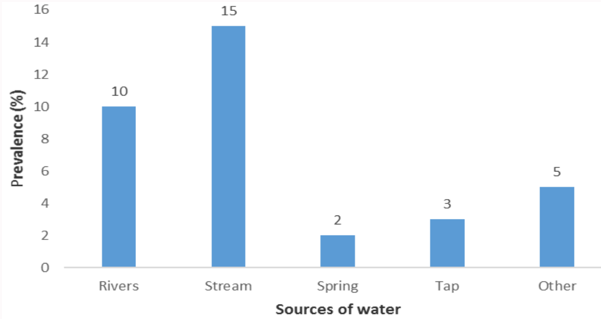

Figure 8: Prevalence of helminths with respect to Water source.

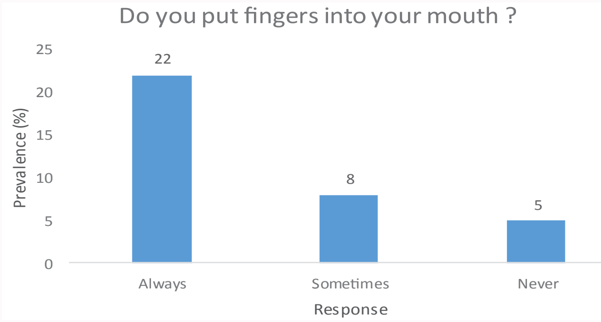

Figure 9: Prevalence of helminths based on putting fingers and objects to the mouth.

occurrence of geohelminths with a prevalence of 31% while those using the water system demonstrated a prevalence of 4%. Figure 8 presents the prevalence of parasitic geohelminths based on water sources. This figure shows that the prevalence of helminths was high among those using stream water with a prevalence of 15% followed by those using rivers as their source of water with a prevalence of 10%. Figure 9 shows the frequency of parasitic geohelminths based on whether respondents put fingers or other objects into their mouths. The prevalence of helminths was high among those who always put their fingers in their mouth with a prevalence of 22%. The lowest prevalence was seen in those who never put fingers or other objects (5%) into their mouth. Figure 10 shows the prevalence of parasitic geohelminths based on whether respondents walk barefooted or not. This figure shows that the highest prevalence of helminths was seen in those who always walk barefooted (22%) and 11% was seen in those who said they sometimes walk barefooted and only 2% was seen among those who never walk barefooted.

Discussion

The result of this cross-sectional study carried out in the community of Ntamuchie shows that 35% (35/100) of the sample population were infected with geohelminths. This prevalence may be due to poor hygienic conditions and environmental hygienic practices by people in the community, such as, playing in dirty surroundings, putting on dirty dresses, playing with fingers on the ground, putting dirty fingers and objects into the mouth, not washing fruits and hands before eating, picking food from the ground and eating and moving barefooted. Generally the most prevalent intestinal geo-helminthes were Hookworms (17%) and *A. lumbricoides* (17%). The results of this study agree with those carried out in Sasiga District, Southwest (Ethiopia) where *A. lumbricoides* (23%) and Hookworms (21%) had the highest prevalence of intestinal geo-helminths [11]. The result

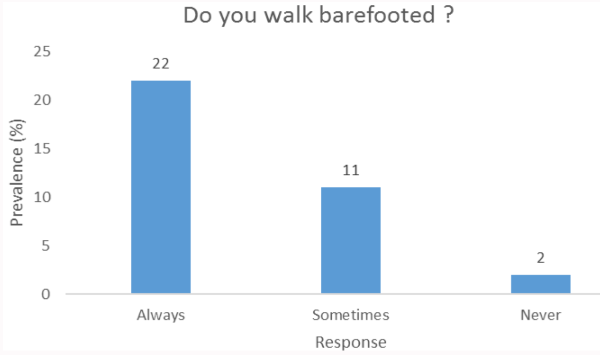

Figure 10: Prevalence of helminthes based on whether they walk barefooted.

shows that females were more infected than males. This can be better explained by the fact that in addition to household work, women in this area are also engaged in handling of livestock and farming and thus are comparatively more exposed to contaminated soil and water, a major predisposing factor for infection. This finding is in agreement with those of Keutchazoue et al. [12] in Cameroon. The results show that the age group 0 to 14 years had the highest level of helminthic infections (25%). The highest prevalence observed among children of age between 0 to 14 years could be as a result of the fact that they always play with soil. The soil is known to harbor a good number of intestinal parasite eggs which eventually find their way into the body of their host as a result of unhygienic practices. Also, low body immune system especially as concerned children might be responsible for the high rate of infection [13]. The results show that respondents of other professions that were not specified showed the highest parasitic helminthes infections with a prevalence of 31%, teachers showed a 0% level of infections while Farmers instead demonstrated a 4% level of geo-helminths infections, this goes a long way to explain that education has a lot to do with geo-helminthic infection as educated individuals have knowledge on hygiene and know about deworming as compared to farmer who are at high risk as they deal with soil and again have little or no knowledge about worm and deworming. These results are similar to results reported by Forrester et al. [14] but in disagreement with those of Kuete et al. [15]. The results show that the pit toilet (31%) is a major risk factor as compared to the water system (4%). These results were equally recorded from the Newbell Central Prison Cameroon with a percentage of 25.6% for pit toilet and 18.7% water system [16]. But is different from the result gotten from Ethiopia where pit toilet had a 3% and 31% for private toilet [11]. This high percentage for users of pit toilets could be due to the fact that many people tend to use those even passersby and most of the time these passerby's are infected. These results showed that the prevalence of helminths was highest among those using stream water with a prevalence of 15% and then 10% among those using rivers as their source of water. Similar studies conducted by Hussein in Iraq [17] and Ngui et al. [18] in Malaysia also showed a higher rate of infection among children who drink untreated water than those who drank treated water. This high prevalence may be due to contamination of streams and rivers with human waste, poor quality of water, faulty sewage lines and insufficient treatment with chlorine. This study shows that putting fingers and other objects in the mouth is a high risk factor for geohelminths. This observation could be due to the fact that these objects and fingers were dirty and perhaps contaminated with eggs of geohelminths before introduction into their mouths. The results confirm the response in the questionnaires as persons who said they never put fingers and objects into the mouth were seen to have the lowest prevalence. This result shows that higher prevalence of intestinal geo-helminthic infection was found in people who always walk barefooted. Walking barefooted in a warm humid climate where poor personal hygiene and environmental sanitation practice are very important risk factors for hookworm infection. In this study, hookworm infection was significantly associated with shoe-wearing habits, methods of waste disposal, defecation habits, source of drinking water, cleanliness of fingernail, and hand washing habit after toilet use.

Conclusion

Given that intestinal parasitic infections are intimately associated with poverty, poor environmental sanitation and lack of potable clean water supply, it is crucial that these factors are addressed effectively in a sustainable manner. Improvement of sanitation, health education to promote awareness about health and hygiene together with periodic mass deworming exercises are better strategies to control these infections. Effective control measures are well formulated in place, these communities (especially Ntamuchie) will have a greater opportunity for a better future with respect to health-care delivery system.

References

1. World Health Organization. International statistical classification of diseases and related health problems. Geneva: World Health Organization. 2006:E44.
2. Pullan R, Brooker S. The health impact of polyparasitism in humans: Are we under-estimating the burden of parasitic diseases? Parasitology. 2008;135(7):783-94.
3. WHO. Sustaining the drive to overcome the global impact of neglected tropical diseases. Second WHO report on neglected tropical diseases? Geneva. WHO. 2013.
4. Fleming FM, Fenwick A, Tukahebwa EM, Lubanga RG, Namwangye H, Zaramba S, et al. Process evaluation of schistosomiasis control in Uganda: Perceptions, attitudes and constraints of a nation programme. Parasitology. 2009;136(13):1759-69.
5. Degarege A, Legesse M, Girmay M, Animut A, Erko B. Malaria and related outcomes in patients with intestinal helminths: A crosssectional study. BMC Infect Dis. 2012;12:291.
6. Nacher M. Interactions between worms and malaria: Good worms or bad worms? Malar J. 2011;10:259.
7. Cheesbrough M. District laboratory practice in tropical countries. 2nd Ed. Part 1. Cambridge University Press Cambridge. 2006.
8. Bismarck NN, Payne VK, Cedric Y, Nadia NAC. Gastrointestinal helminth infections and associated risk factors amongst school aged children in Kouoptamo Noun Division, West Region, Cameroon. Int Arch Public Health Community Med. 2020.
9. Kimengsi JN, Nguh BS, Nafoin AS. Peri-urban land use dynamics and development implications in the BamendA III municipality of Cameroon. Sustainability in Environment. 2017;2(3):273.
10. Willis HH. A simple levitation method for the detection of Hookworm Ova. Medical J Australia. 1921;2(18):375-6.
11. Sitotaw B, Shiferaw W. Prevalence of intestinal parasitic infections and associated risk factors among the first-cycle primary schoolchildren in Sasiga District, Southwest Ethiopia. J Parasitology Res. 2020;13.
12. Igore K GG, Payne VK, Nadia AC, Cedric Y. Risk factors associated with prevalence and intensity of gastrointestinal parasitic infections within households in Tonga Sub-Division, West Region, Cameroon. J Infect Dis Epidemiol. 2020;6:123.
13. Alli JA, Okonko IO, Oyewo AJ, Kolade AF, Nwanze JC, Ogunjobi PN, et al. Prevalence of intestinal parasites among palm wine drinkers in Ibadan metropolis. Researcher. 2011;3(11):11-16.
14. Forrester JE, Scott ME, Bundy DAP, Golden MHN. Clustering of Ascaris lumbricoides and Trichuris trichiura infections within households. Trans R Soc Trop Med Hyg. 1988;82:282-8.
15. Kuete T, Fomefret LS, Yemeli Essono EM, Nkoa T, Moyou RS. Prevalence and risk factors of intestinal helminth and protozoa infections in an urban setting of Cameroon: The case of douala. Amer J Epidemiol Infect Dis. 2015;3(2):36-44.
16. Maxwell C, Hussain R, Nutman TB, Poindexter RW, Little MD, Schad GA, et al. The clinical and immunologic responses of normal human volunteers to low dose hookworm (Necator Americans) infection. Am J Trop Med Hyg. 1987;37(1):126-34.
17. Hussein TK. Prevalence and related risk factors for Giardia lamblia infection among children with acute diarrhoea in Thi-Qar, Southern Iraq. Thi-Qar Medical J. 2010;4(4):68-74.
18. Ngui R, Ishak S, Chuen CS, Mahmud R, Lim YAL. Prevalence and risk factors of intestinal parasitism in rural and remote West Malaysia. PLoS Negl Trop Dis. 2011;5(3):974.