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Prevalence of Amoebiasis among Patients Attending Longisa County Hospital, Bomet County, Kenya

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Abstract

Amoebiasis is a common life-threatening parasitic disease affecting 12% of the world population and the third leading cause of mortality due to parasitic infections worldwide, after malaria and schistosomiasis. It is estimated that about 500 million people are at risk of infection with amoebiasis yearly. In under-developed and developing countries, infection occurs more commonly in areas of low socio-economic status, poor sanitation and nutrition. In Kenya, there is no continuous surveillance system to combat amoebiasis hence its real prevalence remains unknown in most parts of the country despite majority of the rural population living in areas at risk of infection due to inadequate sanitation and lack of save water for domestic use. The study aimed at determining amoebiasis prevalence at Longisa County Hospital at Bomet County Kenya located within the Rift Valley. A retrospective survey was used through evaluation of data from hospital records for a period of five years. The study revealed that out of 5480 stool samples examined at the hospital laboratory during the period January 2009 to December 2013, 1574 (28.72%) stool tests were positive for amoebiasis of which 10.47% were males while 15.76% were females. The least affected age group was children under age five years at 2.37% based on hospital laboratory data. The disease prevalence was at its peak during the month of February (47%) cumulatively for the five years of study. There is need for routine stool examination for amoebiasis in patients presenting with diarrhea and treatment given to control the disease. Understanding the extent of amoebiasis in the region adds valuable information needed for planning and policy making towards minimizing the effects of the disease.

Key words: Prevalence; Amoebiasis; microscopy.

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1. Introduction

Amoebic infections are a significant health problem worldwide, particularly in tropical countries and places where public hygiene and sanitation are poor. It is the third leading cause of mortality due to parasitic infections worldwide after malaria and schistosomiasis [17]. It has been established that, approximately 500 million individuals are infected with amoebiasis each year and only about 10% experience symptomatic disease [5]. Transmission is mainly through ingestion of fecally contaminated food or water containing *Entamoeba* cysts [15]. The cysts measure 10-18 mm in diameter and contain four nuclei. Cysts are resistant to environmental conditions such as low temperature and the concentrations of chlorine commonly used in water purification but can be killed by heating to 55^{o}C [16]. After ingestion, the cyst, which is resistant to gastric acidity and digestive enzymes, excysts in the small intestine to form eight trophozoites. These large, actively motile organisms colonize the lumen of the large intestine and may invade the mucosal lining. Once *E. histolytica* trophozoites invade the intestinal mucosa, the organisms multiply and spread laterally underneath the intestinal epithelium to produce characteristic flask-shaped ulcers [11]. Studies have demonstrated that 4-10% of individuals infected with *E. histolytica* develop amoebic colitis, and less than 1% of individuals develop disseminated disease, such as amoebic liver abscess [12]. Amoebic colitis may occur within two weeks of infection or be delayed for months. The onset is usually gradual with colicky abdominal pains, frequent bowel movements and diarrhea associated with blood-stained stools with a fair amount of mucus [15]. Amoebic colitis affects all age groups, but its incidence is strikingly high in children, 6-10 years of age [17]. Severe amoebic colitis in infants and young children tends to be rapidly progressive with frequent extra-intestinal involvement and high mortality rates, particularly in tropical countries. Occasionally, amoebic dysentery is associated with sudden onset of fever, chills and severe diarrhea, which may result in dehydration and death in infants [1]. Amoebiasis is preventable, yet it continually causes deaths globally, with high infection rate in developing countries. Amoebiasisis is a public health problem in Kenya and although not given much attention, it exacerbates considerable pain and death in the population. A number of studies on amoebiasis have been done in different parts of Kenya but none has been carried out in Bomet County. Longisa County Hospital being the only district hospital in the County gave a representative picture of the status of amoebiasis in the region. Laboratory documentation provided a basis to investigate temporal changes in the disease prevalence at the hospital and by extension related to the climatic changes for the five years from January 2009 to December 2013. The study aimed at establishing the prevalence of amoebiasis in patients attending Longisa County Hospital, Bomet County.

2. Materials and methods

2.1 Study site

The study was conducted at Longisa County Hospital, located in Bomet County in the Kenya Rift Valley. The hospital is situated 15 Km from Bomet town, 180 Km south-west of Nairobi, Kenya capital. The hospital deals with diagnosis, treatment and control of various illnesses ranging from intestinal parasitses such amoeba and helminthiasis, malaria, typhoid, cholera, TB, skin infections, accidents, surgeries, mother and child health care and HIV/AIDS management among others for both in and out patients. The hospital was selected for the study

because it is a government health center where services are affordable and accessible to most of the local population and would therefore capture patients from the whole of Bomet County. The area is an agricultural where residents are in constant contact with the soil as they cultivate their farms. The temperature is moderate (18-25^{0}C) throughout the year. There are two rainy seasons, short rains between the months of October to November and long rains between the months of March to August. Housing is heterogeneous, ranging from scarce well-constructed homes to wood and grass thatched houses. Only a small number of homes have piped water and most people use pit latrines for human lumen waste disposal. County hospital laboratory was used for this study and receives approximately 800 patients per month according to hospital records.

2.2 Study design

A retrospective study in which hospital laboratory records on cases of amoebiasis contained in hospital databases for a period of five years between January 2009 to December 2013 were examined to investigate cases of amoebiasis diagnosed in the hospital laboratory. The laboratory diagnostic method involved wet microscopy.

3. Results

Out of 5480 stool samples examined for amoebiasis during the five year study, 1574 tests were positive for *E. histolytica*. This translated to 28.7% stool tests which were positive for *E. histolytica* while 1.73% was positive for intestinal worms (Table 1). The stool samples that tested positive for amoebiasis gave a ratio of approximately 7: 4: 1 for females, males and children aged zero to five years respectively implying that more females were infected almost twice more than males.

Table 1: Cases of amoebiasis in females, males and children (0-5 yrs) during the period, January 2009 to December 2013

Year	**Total patients**	**Total stool sample**	**Positive cases of amoebiasis**			
			Female (%)	**Male (%)**	**Children (0-5yrs) (%)**	**Intestinal worms (%)**
2009	11,807	1,263	145(11.5)	134(10.6)	39(3.1)	12(1)
2010	12,360	1,308	226(17.3)	184(14.1)	39(3.1)	35(2.7)
2011	10,094	1,247	253(20.3)	110(8.8)	23(1.8)	33(2.6)
2012	12,390	638	112(17.6)	76(11.9)	15(2.4)	27(4.3)
2013	14,051	1,024	131(12.9)	73(7.1)	14(1.4)	15(1.5)
Total	60,702	5,480	867(15.8)	577(10.5)	130(2.4)	97(1.8)
Average/year	12,140	1,098	173	115	26	19
	Ratio		7 : 4 : 1			
	prevalence(%)		15.76	10.47	2.37	1.73

Data from Longisa County Hospital laboratory 2009 to 2013.

Amoebiasis prevalence for the study period was calculated by; (total positive stool samples/total stool samples examined) x100. Percentage proportions of positive stool samples were calculated by;(average number of positive stool samples per year /average number of stool sample examined per year) x 100

Females =$\frac{173}{1098}$X100 = 15.76, Males =$\frac{115}{1098}$ x100 = 10.47, Children (0-5yrs) = $\frac{26}{1098}$x100 = 2.37

Monthly and annual trends showed that, the month of February recorded the highest positive cases (47.1%). The lowest proportion of positive samples was recorded in the month of August (20.1%) and September (20.3%). The year 2010 recorded the highest number of positive cases of amoebiasis (34.8%) as compared to (21.3%) registered in the year 2013. Data was missing in the records for the months of September and October 2009 and the months of January and February 2011 (Table 2).

Table 2: Monthly and annual trends of amoebiasis cases for the period, January 2009 to December 2013

Month	**Stool samples positive for amoebiasis**					**Total Stool samples positive for amoebiasis**	**Total samples examined**	**Percentage proportion of positive stool samples (%)**
	2009	**2010**	**2011**	**2012**	**2013**			
Jan	15	39	*	9	10	73	282	25.9
Feb	51	40	*	20	29	140	297	47.1
March	69	50	14	15	18	166	545	30.5
April	26	63	23	15	7	134	406	33.0
May	30	50	29	13	16	138	412	35.5
June	23	40	33	12	8	116	398	29.1
July	23	30	24	30	20	127	550	23.1
Aug	26	20	27	11	11	95	473	20.1
Sep	*	22	44	12	30	108	533	20.3
Oct	*	28	74	24	22	148	476	31.1
Nov	35	37	86	30	24	212	613	34.6
Dec	20	30	32	12	23	117	495	23.6
Positive Total	318	449	386	203	218	1574	5480	28.72
Total samples examined	1263	1308	1247	638	1024	5480		
% Positive cases	**25.2**	**34.3**	**31**	**31.8**	**21.3**	**28.72**		

*Data was missing in the records.

Percentage proportions of positive stool samples were calculated by; total number of positive stool samples /total number of stool samples examined x 100.

For December it is $\frac{117}{495}$ x 100 = 23.6%.

3.1 Seasonal trends of amoebiasis

During the dry season, January to March, in all the five years, there was a gradual increase in amoebiasis infection rate and a decline during the period of April to August for all the years which coincide with the long rainy season. There was also a slight increase in amoebiasis infection during the short rainy season, October to November.

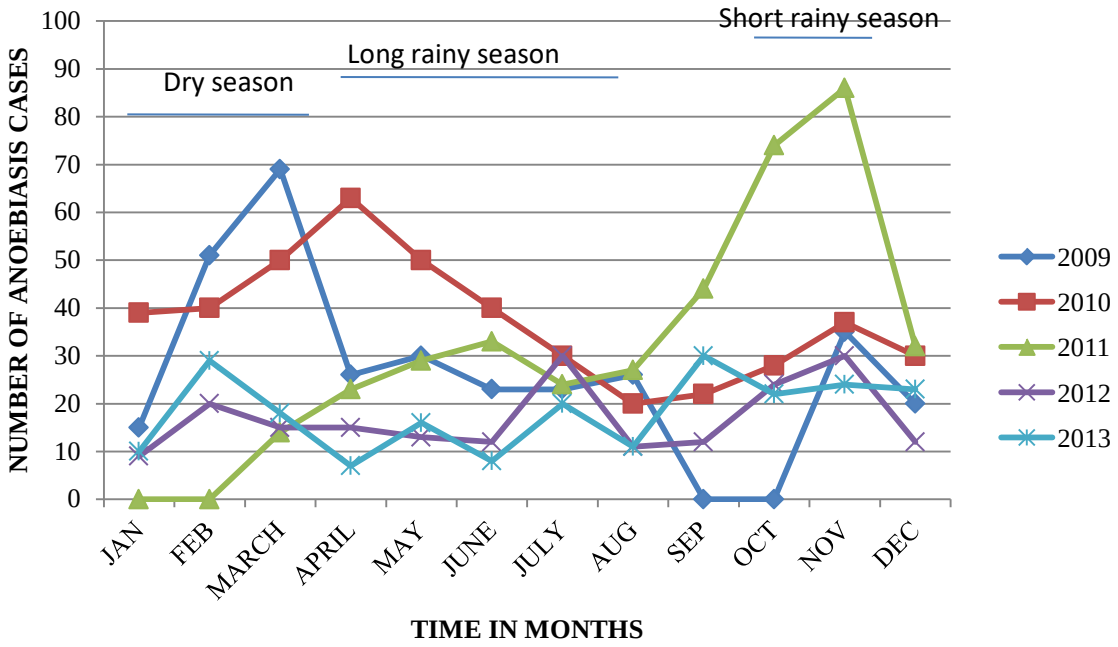

Figure 1: Seasonal distribution of amoebiasis for the period 2009 to 2013

Additional data on amoebiasis cases was obtained by a cross sectional study between January to June 2014 using 255 stool samples from patients presenting with diarrhea at the hospital**.** Out of the 255 stool samples examined, 50 (19.6%) were positive of amoebiasis and 205 (80.4%) were negative. Among the positive individuals, it was found out that 30 out of 129 (23.3%) were adult females, 18 out of 114(15.8%) were adult males and 2 out of 12 (16.7%) were children under the age of five years. This gave a ratio of 15:9:1 in adult females, adult males and children respectively similar to the findings of the retrospective study were the ratio was 7:4:1. Adult females (23.3%) recorded slightly higher infection rate compared to adult males and children under the age of five years.

4. Discussion

4.1 Prevalence of amoebiasis during the study period

The current study recorded relatively high prevalence of amoebiasis at 28.7% for the period, January 2009 to December 2013. This can be attributed to the fact that the Longisa Hospital uses microscopic examination which does not differentiate *E. histolytica* from *E. dispar* which is nonpathogenic. It can also be attributed to poverty, poor water sources that may be contaminated and inadequate water supply, type of houses, ignorance and poor personal hygiene. Studies in some African countries have recorded 6% to 75% of the population infected with the parasite [13]. For example, in Kenya, a prevalence rate of 21% has been reported in Nakuru County based

on data from Njoro PCEA health center [9]. A study done in Kitui County revealed a prevalence of 42.1% in school children aged between 6-12 years in Kyuso Zone [8].

From 2009 to 2014 there was a general decline in infection at the hospital. This can be attributed to campaigns by the Ministry of Health and NGOs aimed at reducing diarrhea and other diarrhea related infections such as amoebiasis. One of such campaigns targets washing of hands at four critical times; that is before eating, after using a toilet, before preparing food and after changing the baby's nappies [18].

This study recorded varied amoebiasis infection rates in females, males and children under the age of five years (Table 1). All people are believed to be susceptible to infection, but individuals with a compromised or undeveloped immunity may suffer more severe forms of the disease. People of all ages in developing countries are at risk of amoebiasis infection although prevalence among the ages varies greatly [16]. The tropical and sub tropical and other areas where there is low level of sanitation and very poor personal hygiene practices are mainly more affected [6].

Considering the percentage rate of infection, children under the age of five years were the least infected compared to adults. Children in this category are normally under the care of their mothers/caregivers and are often restricted to environments relatively less contaminated hence the reduced infection risks. A study that was done in Bangladesh, on *Entamoeba histolytica* infection in pre-school children and protection from subsequent ameobiasis recorded the low prevalence of amoebiasis in children under the age of five years [4].

From the hospital records, females recorded a slightly higher prevalence of 15.76% and 23.3% compared to 10.47% and 15.8% for males for retrospective and cross-sectional studies respectively. This can be attributed to cultural practices and gender roles which include domestic chores such as cooking, washing as well as farming which mostly increases involvement with contaminated water and soil. A study done in Gambia, Western Africa revealed that 45% of females carry the parasite versus 25% of the male population [2].

4.2 Trend of Amoebiasis

4.2.1 Monthly and yearly trends of amoebiasis

It was noted that the dry season (January to March), in almost all the five years, recorded an increase in amoebiasis infections followed by a slight decline during the long rainy season (April to August). The Eastern part of Bomet County, that is, Chepalungu Constituency and parts of Bomet East constituency depend on dams as the main source of domestic water for use.

During the dry season, water level in the dams and rivers become low and the water is more prone to contamination from animal feaces and other forms of dirt which could be harboring parasites hence increasing risks of infection.

A research that was conducted to determine the prevalence of *E. histolytica/dispar* and *Giardia lambia* in primary school pupils in five villages in Kaduna and Zaria in Nigeria revealed a higher prevalence in the dry

season (January to May, with peak in April) months than the rainy seasons [7].

The month of February cumulatively for the five years of study recorded an infection rate of 47.1% which was high compared to the other months (Table 2). The region experiences high temperatures during this month (Daily constant temperatures of 42^0C throughout the year rarely exceeding 52^0C or dropping below 41^0C according to weatherspark.com) and shortage of water, hence prone to contamination during this month. This result is similar to a study that was done in Mexico, which reported that infection rate with amoebiasis is high when there is inadequate water supply [3]. Also inadequate water supply causes humans and animals to share the same water sources, leading to contamination by reservoir host animals such as dogs and cats [10].

Generally, there was gradual decline in amoebiasis cases in the five and half years of study. This may be due to the campaigns that have been done by the government of Kenya through the Ministry of Health and NGOs particularly through the audio-visual and print media, targeting control of fecal-oral transmission of the parasite [18].

This suggests a gradual decrease in prevalence of amoebiasis in the recent years. Efforts to reduce widespread cases of amoebiasis and related diseases such as diarrhea, acute respiratory infections and malaria has been done though the following activities with the aim of achieving Millennium Development Goals i) Provision of emergency services in rural areas through purchase of ambulances ii) Improving literacy levels among mothers as they attend antenatal and post-natal clinics. Infant feeding and weaning practices are taught during these clinics iii) Provision of clean safe water for domestic use and sanitation facilities iv) Building of health centers in many parts of the County.

There still exist many challenges in Bomet County in attaining the above goals such poor roads, inadequate health care providers in the health centers, ill-equipped hospitals and health centers while majority of the residents do not have access to clean safe water for domestic use [14].

5. Conclusions

The current study recorded a prevalence of 28.7% of amoebiasis in the patients attending Longisa County hospital during the study period. The ratio for infected females: males: children (zero to five years) was 7:4:1 meaning females were almost twice infected as males while children below the age of five years were relatively less infected.

6. Recommendations

Further work is needed to establish the general prevalence of amoebiasis in the general population without relying on hospital records only as in the current study. There is need for the Ministry of Health and all stakeholders to scale up control of amoebiasis in Bomet County through sustained campaigns aimed at educating the residents on preventive measures. Also, continuous stool examination for patients presenting with diarrhea at the hospital needs to be done and prompt treatment given to control the disease. There are plans for studies to establish the real prevalence of *Entamoeba histolytica* which is potentially more pathogenic relative to

Entamoeba dispar in Bomet County using molecular studies.

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