Epidemiology and Molecular Characterization of *Cryptosporidium* Species among Children and HIV Infected Individuals in the North Rift Region of Kenya

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ABSTRACT

This prospective study on C*ryptosporidium* and cryptosporidiosis was carried out in the North Rift region of Kenya*. Cryptosporidium* parasites are leading causes of enteric disease, more so in children and HIV infected individuals. A total of 317 fecal samples from children less than five years of age, and 1794 fecal samples from HIV infected persons seen at Moi referral and Teaching Hospital, Eldoret and at two health centres in the North Rift region of Kenya were collected over a period of one year covering January to December 2005. This study area was chosen because there are no reports on the burden of cryptosporidiosis in this region and therefore the results this study highlight this burden and contribute towards the general picture of cryptosporidiosis in Kenya. Overall prevalence of cryptosporidiosis in children was 9.8% and among HIV infected individuals it was 3.2%. The highest prevalence was observed between March and April, and a smaller peak between June and July. Both periods corresponded to the relatively dry seasons in the North Rift region of Kenya.

The rate of diarrhea in the HIV positive individuals was 35.1% with a cryptosporidiosis prevalence of 6.5%. Cryptosporidiosis was significantly associated with diarrhea (OR= 4.7087, P≤0.002), skin rash among HIV positive individuals (OR= 2.2145, P=0.0033) and headache (OR= 1.8087, P= 0.0279). However, other symptoms such as abdominal pains, cough, fever and vomiting were not significantly associated with cryptosporidiosis, in both the pediatric and HIV positive study groups. In the pediatric group all subjects were diarrheic and duration of diarrhea of more than two weeks was more likely to be associated with the presence of cryptosporidiosis (OR= 1.8301) when compared to those with diarrhea for less than one week.

There were no significant sex related differences observed in the cryptosporidiosis prevalence in the children (P= 0.9752) or in the HIV positive persons (P= 0.5029). Similarly, environmental factors such as location of residence, waste disposal, water sources and treatment, presence of animals in homesteads or household size were not significantly associated with cryptosporidiosis.

Genotype analysis based on polymerase chain reaction and restriction fragment length polymorphism (PCR-RFLP) of the 18S rRNA gene fragment revealed that among the children about 82% of the isolates were *C. hominis* and nearly 18% were *C. parvum*. Among the HIV infected persons, on the other hand, about 68% of the isolates were *C. hominis*, about 14% *C. meleagridis*, and 18% were *C. parvum*. Based on the trinucleotide sequence analysis there were 12 subtypes of *C. hominis* and 7 subtypes of *C. parvum* in circulation in the North Rift region of Kenya.

The results suggest that cryptosporidiosis prevalence is comparable to other regions of the world with *C. hominis* being the most common species circulating study area followed by *C. parvum* and *C. meleagridis* in that order. Mixed *C. hominis* and *C. parvum* infections also occurred, and constituted about 1% of the infections. These results suggest that human-to-human transmission is the main mode of spread of cryptosporidiosis in the region.