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Full Length Research Paper

Assessment of fecal parasitism for decision making in continued deworming of slum stray dogs in Nairobi areas of Kenya

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The objective of this study was to establish the density of infestation of slum dogs with gastrointestinal helminths in locations where vaccination and deworming campaigns had been carried out for a period of 3 years. A total of 150 dogs were randomly sampled from a total of 300 animals that were attended to in a rabies control campaign in Nairobi slum areas between the months of July and September, 2011. Eggs per gram (EPG) and worm identification were done from the fecal samples of the animals included in the study and the prevalence on age, sex and breed were also determined. The EPG were generally high for both hookworms and ascarids with a range of 1083 to 1105 and 515 to 637, respectively. The larvae of the most prevalent species identified were *Ancylostoma caninum* and *Toxocara canis*. There was no statistical significant difference (P=0.9) between EPG counts in males and females at p<0.05. The prevalence was high among the puppies at 58.8% (44/75) as compared to the adult dogs at 38.3% (29/75) when P = 0.01. From the findings of this study, it was concluded that the density of infestation of stray slum dogs with gastrointestinal worms was high and therefore there is need to address routine and strategic deworming.

Key words: Prevalence, helminths, dogs, Kenya.

INTRODUCTION

Stray dogs according to the OIE (2009) are defined as any free roaming dog not under direct control or restriction at a particular time or a free roaming dog with no owner. Strays may also include the quasi-owned animals that are cared for or considered to belong to the "neighbourhood" (Childs et al., 1998). Stray dogs pose several public health risks and concerns to humans, such as rabies (Reyers et al., 1998; Crosby, 2011), toxocariasis and ancylostomiasis (Croese et al., 1994; Prociv and Croese 1996; Singla et al., 2005; Chen et al., 2012), hydatidosis (Buishi et al., 2006), acquired epilepsy due to neurocysticercosis (Sharma et al., 2011), leishmaniasis, borreliosis, bartonellosis, ehrlichiosis, rickettsiosis (Day, 2011; Singla et al., 2011), and schistosomiasis (Hackett and Lappin, 2003).

For the past five years, a strategy to reduce and eradicate rabies using vaccination campaigns and community education have been carried out in several parts of Kenya by the Department of Clinical Studies, University of Nairobi, in cooperation with other private

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welfare organizations like Kenya Society for Protection and Care of Animals (KSPCA), Africa Network for Animal Welfare (ANAW) and through the government (Ministry of Livestock and Fisheries). Due to other welfare concerns, such as malnutrition, helminthiasis and infestation with ectoparasites as observed in the campaign, there was need to assess and prioritize the inclusion of certain health programs within the campaign with the limited budget allocations. Therefore, the aim of this study was to assess the prevalence and fecal egg counts within the slum dogs that were attended to in the rabies control program.

MATERIALS AND METHODS

Study area

The study area was Kawangware which is a slum area in Nairobi Kenya located 15 km west of Nairobi city Centre. Kawangware is situated between latitude -1.2833 and longitudes 36.7333. This area was purposively selected being one of the slum areas covered by the vaccination and deworming programs for slum dogs by the Department of Clinical Studies in the Faculty of Veterinary Medicine, University of Nairobi.

Sampling

A total of 150 study animals (50%) were selected for this study through a systematic random sampling. The first dog was randomly selected and every fifth animal was sampled after the first dogs. Sample collection was carried out between the months of July and September, 2011. Fecal samples of approximately 5 to 10 g were obtained directly from the rectum of the animals using a clean glove. The fecal samples were stored at 4°C before coprological analysis as described by Nolan et al. (2006). All fecal samples were analyzed for eggs per gram, type of eggs (strongyle, hookworm, whipworm, ascarid) and four pooled sample groups of 10 samples each were randomly selected for egg culture and larvae recovery as described by Kaufmann (1996). Two groups were obtained from the puppies and the other two from adult group. Specific identification was then done under a microscope and individual helminth infection densities were calculated.

Data analysis

Data were entered in Microsoft Excel. Data were analyzed using IBM SPSS Statistics (Version 22.0, 2013 SPSS Inc., Chicago III) for the determination of frequencies and differences in age, sex, and other parasitic infestations established and the levels of infestations as depicted by the EPG counts as the outcome.

RESULTS

Of 150 dogs sampled, 54.6% comprised males whereas 45.4% were female. Of the sample size, 50% were puppies (less than one year) while the other 50% were adults.

The prevalence rate for helminthosis was 40.3% in the slum dogs in Kawangware. The mean EPG for dogs infested by hookworms was 1105, while ascarids were 636.4. The most prevalent gastrointestinal nematode in dogs was the hookworm at an average of 1105.0 EPG of feces, ascarids at an average of 636.4 EPG of feces and an average of 300.0 EPG of feces for whipworms. The most prevalent gastrointestinal nematode in dogs was the *Ancylostoma* species at 33.7%, followed by ascarids at 6% and whipworms at 0.6%. The most prevalent species of *Ancylostoma* was confirmed as *Ancylostoma caninum* (90.1%) whereas 9.9% was composed of *Uncinaria stenocephala* and *Ancylostoma braziliense.* The most prevalent ascarid was confirmed as *Toxocara canis* (61.1%) and *Toxoascaris leonina* (38.9%).

The infestation density in puppies and adults differed with gastrointestinal worm infestation density being 58.8 and 38.3%, respectively. Age was a statistically significant factor in relation to helminth infestation with p=0.01 with a confidence interval (2.179, 20.594) and a standard error of 0.573.

There was no statistically significant correlation between age and ascarid infestation (p=0.056) although it appeared that younger dogs were at a higher risk of infestation.

There was no statistically significant difference (p=0.9) in prevalence rates between males (25.3%) and females (20%) in the slums which could be attributed to the higher population of males sampled.

DISCUSSION

This study aimed at determining the density of infestation of gastrointestinal worms in stray slum dogs in order to use the results as a decision support tool for the inclusion of deworming in the rabies campaign and health program performed in Nairobi slum areas on stray dogs.

The gastrointestinal worms with the highest infestation density in stray dogs in Kawangware slum in Nairobi were hookworms with an EPG of 1105. The findings of this study agreed with Kanyari and Kagira (2001) who concluded that *A. caninum* was the most prevalent in dogs in Kenya. However, dogs in this slum had an infestation density of 90.1% which was much higher than 41% as was recorded by Kanyari and kagira (2001) in Kenya and 37.6% as was recorded by Anene et al. (1995) in dogs in South Africa. The gastrointestinal worm with the second highest EPG were ascarids at 636.4 with *T. canis* (61.1%) having the highest infestation density. This infestation rates were higher than 31.5% (*T. canis*) in South Africa by Anene et al. (1995). In general, this pattern of infestations was constituent with other studies as reported by Ugbomoiko et al. (2008) in Nigeria. This pattern of infestations densities may be attributed to the role of humans in the lifecycle of the worms. The general observation in the area was insufficient toilets and poor disposal of human waste coupled with close interaction between dogs and mostly children. This may have

provided an alternatives host and propagated infestation of dogs in different areas, especially during rainy season where both human and animal waste would be moved by surface water to different areas.Stray dogs in Kwangware slum areas had the whipworm infestation rate of 0.6%, and an EPG of 300 which was the least compared to hookworms and ascarids found in the fecal samples. This finding was partially in agreement with studies done by Kagira and Kanyari (2001) who did not record any whipworm in their study.

Age was a statistically significant factor in relation to helminth infestation with p=0.01 with a confidence interval of (2.179, 20.594) and a standard error of 0.573.There was also statistically significant correlation between age and ascarid infestation (p=0.056) with younger dogs being at a higher risk of infestation. This finding was in agreement with other studies done in in Africa where gastrointestinal helminth prevalence was higher in puppies than adults 58.8 and 38.3%, respectively. Swai et al. (2010) in Tanzania established that prevalence in puppies was 24%, while in adults it was 3%, and in Kenya, Kagira and Kanyari (2001) also conclude that prevalence was higher in puppies. This was attributed to the lifecycle of the ascarids which allow for intraperitoneal infestation of fetuses and oral infestation of puppies by hook worms during suckling form bitches that are not dewormed appropriately. Moreover, the community did not consider deworming especially of the young dogs as a priority. The more indiscriminate feeding behaviors of younger dogs than the adults were also attributed to an increased infestation density at the time of sampling.

There was no statistically significant difference in prevalence rates between males 25.3% and females 20% in the slums which could be attributed to the higher population of males sampled. This finding was in agreement with a study done in Kerman city, Iran where Hadizadeh and Sharifi (1994) concluded that with a prevalence of 87.2 and 80% in females and males, respectively, there was no significant difference between dogs in regards to the gender. From the study, it was concluded that the slight difference in the infestation intensity was as a result of a higher number of male dogs being presented for vaccination. From observation, male dogs were more popular to the children (mostly boys) who were mainly charged with bringing the dogs for vaccinations.

The researchers recommended that while there was a high infestation density of gastrointestinal worms in stray dogs in Kawangware, more research should be carried out to identify the relationship between the sex of dogs and the gender of the handlers as well as the prevalence of zoonotic gastrointestinal helminths in humans in Kawangware.

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Conflicts of interest

Authors have none to declare.

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