A Survey of Canine Heartworm Awareness in Grenada, West Indies

Sylke Lohmann\textsuperscript{a}, Sharon Sage\textsuperscript{b}, Diana Stone\textsuperscript{a} & Kathryn Gibson\textsuperscript{a}

\textsuperscript{a} Pathobiology Department, St. George's University School of Veterinary Medicine, Grenada, West Indies

\textsuperscript{b} Grenada Society for the Prevention of Cruelty to Animals, Grenada, West Indies

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Sylke Lohmann,1 Sharon Sage,2 Diana Stone,1 and Kathryn Gibson1
1Pathobiology Department, St. George’s University School of Veterinary Medicine, Grenada, West Indies
2Grenada Society for the Prevention of Cruelty to Animals, Grenada, West Indies

Heartworm is a common parasite of dogs in Grenada, West Indies, due to the tropical climate and large number of mosquitoes. Because Grenada is a developing country and a small island, resources and education on heartworm are limited. In an effort to raise awareness of canine heartworm and the preventive measures available, observations and surveys were performed to determine the following: (a) heartworm knowledge among Grenadian dog caregivers seeking veterinary care at the Grenada Society for the Prevention of Cruelty to Animals (GSPCA), (b) dissemination of heartworm information by GSPCA staff to Grenadian dog caregivers, and (c) reasons Grenadians are not administering heartworm prevention to their dogs. Results indicated a marked deficiency in both heartworm knowledge among Grenadian dog caregivers and heartworm knowledge acquisition and dissemination. Lack of knowledge was also cited as a major reason Grenadian dog caregivers were not using heartworm prevention. These results are currently being utilized to modify heartworm education practices at the GSPCA by incorporating Grenada-specific educational tools, with the ultimate goal of reducing illness and death by canine heartworm.

Keywords: Grenada SPCA, Dirofilaria immitis, animal shelter, dog

Throughout the Caribbean, heartworm is a highly prevalent disease, resulting in both acute and long-term suffering of afflicted nonhuman animals (McCall, Genchi, Kramer, Guerrero, & Venco, 2008). Research on Caribbean islands including the Dominican Republic, Puerto Rico, the Grand Bahamas, and Isla de la Juventud has indicated canine heartworm prevalence can reach as high as 18.2%, 20.4%, 53%, and 63%, respectively (Duran-Struuck, Jost, & Hernandez, 2005; McCall et al., 2008). In Grenada, a 2008 study of randomly selected companion dogs...
showed an overall heartworm prevalence of 25.3% (45 out of 178 dogs), through antigen testing and microfilaria confirmation (Coomansingh, 2008). The highest percentage of heartworm (32.3%; 20 out of 62 dogs) was in the parish of St. George—the most populated of the six parishes in Grenada (Coomansingh, 2008; Government of Grenada, 2013). These data indicate a strong need for heartworm preventive measures in Grenada. They also raise the question of why dogs in Grenada, particularly in St. George, are not receiving heartworm prevention.

Previous studies have demonstrated the effectiveness of canine heartworm prevention and the necessity for client education to promote compliance (Gates & Nolan, 2010). The Grenada Society for the Prevention of Cruelty to Animals (GSPCA) and St. George’s University School of Veterinary Medicine (SGUSVM), both located in St. George, have been instrumental in providing health care to companion animals of Grenadians, as well as in raising awareness of nonhuman animal and zoonotic pathogens in Grenada (Fernandez et al., 2010; Yabsley et al., 2008). Heartworm prevention is available in Grenada and includes multiple name-brand products and an inexpensive formulation provided by the GSPCA. Unfortunately, the GSPCA has inadequate resources for client education due to limited staff and funding (GSPCA staff, personal communication, May 30, 2013).

To address deficiencies in canine heartworm awareness and prevention, a GSPCA/SGUSVM collaborative summer research project was executed to determine levels of heartworm knowledge among Grenadian dog caregivers, heartworm knowledge dissemination, and reasons Grenadians are not using heartworm prevention in their dogs. It was proposed that through analysis of observations and verbal surveys conducted at the GSCPA, an educational protocol could be developed that would increase canine heartworm awareness, as well as address and eliminate identified hindrances to the use of canine heartworm prevention. Results from this study are currently being used to develop educational resources for use at the GSPCA, including a heartworm pamphlet tailored to Grenadian dog caregivers.

MATERIALS AND METHODS

Observations and Surveys

During the summer of 2013, observations of client consultations with GSPCA staff (including employees and volunteers) and verbal surveys of Grenadian dog caregivers and GSPCA staff were conducted at the GSPCA (St. George’s University Institutional Review Board Approval No. 13027). Observations were made using a preset checklist and space for written comments by the researcher. Verbal questionnaires were administered using a set of questions with two to five answer choices. All observations and surveys were conducted by a single researcher. All observations and survey results were anonymous, and informed verbal consent was always obtained from all participants beforehand. In addition, a survey respondent could refuse to answer a question and was free to stop the survey at any time.

Statistical Analysis

Five identical survey questions and one highly similar survey question with identical answer choices were posed to both Grenadian dog caregivers and GSPCA staff. Results from these six
questions were analyzed using a $2 \times 2$ contingency table and two-tailed Fisher exact probability test. A $p$ value of less than .05 indicated significance (Table 1).

### RESULTS

**Observations**

Observations were recorded from a total of four client–GSPCA staff consultations at the GSPCA in July 2013. During the consultations, GSPCA staff always asked if dogs were on heartworm prevention, and all four clients answered yes. In three of the four observations (75%), GSPCA staff further informed clients about the dangers of heartworm. However, more in-depth knowledge regarding the cost–benefit analysis of prevention versus treatment and zoonotic potential of heartworm was not observed (0%). Given the large number of appointments and low number of staff at the GSPCA, the researcher commented that conversations between clients and GSPCA staff regarding heartworm were rushed.

### TABLE 1

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
<th>GSPCA</th>
<th>Caregivers</th>
<th>$p$ Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have you heard about the disease called heartworm?</td>
<td>Yes</td>
<td>10</td>
<td>36</td>
<td>.57</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>0</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Do you know how dogs get heartworm?</td>
<td>Yes</td>
<td>8</td>
<td>16</td>
<td>.035</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>2</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>How many local dog owners do you think use medications to prevent heartworm in their dogs?</td>
<td>&gt; 25%</td>
<td>6</td>
<td>24</td>
<td>.70</td>
</tr>
<tr>
<td></td>
<td>25–50%</td>
<td>3</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>[Are local dog owners visiting the GSPCA given/Have you received any] written information or consistent verbal information about heartworm?</td>
<td>Verbal</td>
<td>9</td>
<td>13</td>
<td>.0029</td>
</tr>
<tr>
<td></td>
<td>Neither</td>
<td>1</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Which of the following would you consider the major reason dog owners may not get medications to prevent heartworm in their dogs?</td>
<td>Cost</td>
<td>8</td>
<td>16</td>
<td>.013</td>
</tr>
<tr>
<td></td>
<td>Lack of heartworm information</td>
<td>0</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>Do you think that humans can get heartworm?</td>
<td>Yes</td>
<td>2</td>
<td>20</td>
<td>.15</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>8</td>
<td>20</td>
<td></td>
</tr>
</tbody>
</table>

**Note.** Results were compared between the Grenada Society for the Prevention of Cruelty to Animals (GSPCA) staff (GSPCA column, $n = 10$, unless indicated otherwise) and Grenadian dog caregivers (caregivers column, $n = 40$, unless indicated otherwise), using a $2 \times 2$ contingency table and two-tailed Fisher exact probability test. $p < .05$ was considered significant. Significant $p$ values are in bold.

*More than two answer choices were available (see Figure 1). Two major answers were compared.

Differences in wording between GSPCA staff (before backslash) and Grenadian dog caregivers (after backslash) are in brackets. The answer choice “Verbal” includes respondents who selected answer choice “Both,” indicating both verbal and written information is given or was received (see Figure 1B).

For Grenadian dog caregivers, $n = 39$ (1 respondent did not answer).

For GSPCA staff, $n = 9$ (1 respondent did not answer). For Grenadian dog caregivers, $n = 37$ (3 respondents did not answer).
Surveys

Verbal surveys consisting of 14 questions were administered to a total of 40 Grenadian dog caregivers from June 2013 to August 2013. To qualify for the survey, caregivers had to be citizens of Grenada, be at least 18 years old, care for at least one dog, not be current or previous GSPCA staff members, and be seeking veterinary care at the GSPCA. Most dog caregivers had heard of heartworm (90% of respondents), knew there are medications to prevent heartworm (92.5%), understood it is necessary for dogs to be on heartworm preventative (100%), and were aware dogs could die if heartworm disease goes untreated (100%). Ninety-five percent of dog caregivers further indicated that they would use heartworm prevention in their dogs if it was affordable; however, 61.5% of respondents felt that less than one out of four Grenadian dog caregivers use heartworm prevention (Figure 1A). In addition, 40% of dog caregivers knew how dogs get heartworm, 42.5% were aware of how often dogs should receive heartworm prevention, 32.5% knew the clinical signs of canine heartworm disease, and only 17.5% knew how dogs are treated for heartworm.

From June 2013 to August 2013, verbal surveys consisting of 10 questions were given to a total of 10 GSPCA staff members. To qualify for the survey, GSPCA staff members had to be currently employed or volunteering at the GSPCA and at least 18 years old. All GSPCA staff members knew about heartworm. Eighty percent of GSPCA staff members also knew how dogs contract heartworm, which differed significantly from Grenadian dog caregivers (Table 1). The majority of GSPCA staff members (60%) also felt that less than one out of four Grenadian dog caregivers use heartworm prevention, which is similar to survey results from Grenadian dog caregivers (Table 1, Figure 1A).

Additional comparisons between GSPCA staff and Grenadian dog caregiver responses revealed that 90% of GSPCA staff said Grenadian dog caregivers were given verbal information about heartworm, but only 32.5% of dog caregivers indicated that they received verbal information (Table 1, Figure 1B). Moreover, 77.8% of GSPCA staff thought that cost was the major reason Grenadian dog caregivers did not use heartworm prevention, which is significantly different from dog caregivers, who considered lack of heartworm information (43.2%) of equal importance to cost (43.2%; Table 1, Figure 1C). Even with these differences, 70% of GSPCA staff members felt that improving heartworm education would be very helpful in preventing and treating heartworm, with the remaining 30% indicating that it would be somewhat helpful.

DISCUSSION

Results from this study strongly indicate there is both a perceived and real lack of knowledge on canine heartworm among Grenadian dog caregivers who use the GSPCA for veterinary care. Furthermore, lack of knowledge was identified by Grenadian dog caregivers as a major contributing factor to the insufficient use of heartworm prevention (Figure 1C). Observations and GSPCA staff surveys demonstrate that the GSPCA does provide verbal information on heartworm to Grenadian dog caregivers. However, results of this study indicate that the current verbal heartworm education provided is not effective, as the majority of dog caregivers surveyed said they had not received any information on heartworm from the GSPCA (Figure 1B).
Those who said they had not received information included dog caregivers who were surveyed after consultations during which heartworm was specifically discussed by GSPCA staff, suggesting dog caregivers either readily forgot or did not comprehend information they
were given. These findings support our recommendation that verbal information should be supplemented with written educational material on canine heartworm that clients can take with them, refer to again, and share with others.

Inadequate canine heartworm awareness among dog caregivers cannot be attributed to substantial deficiencies in GSPCA staff knowledge or total lack of client education about this disease. Members of the GSPCA staff are, for the most part, knowledgeable about canine heartworm. It is important to note that all GSPCA staff surveyed felt that improving client education would be helpful in preventing and treating heartworm in Grenada. Inadequate awareness and knowledge dissemination are likely due to a combination of factors: the small number of GSPCA staff (mostly volunteers), the large number of rushed appointments, the verbal format of educating clients on canine heartworm, and the lack of supplemental written educational materials.

It is interesting that (although not statistically significant) more Grenadian dog caregivers thought heartworm was zoonotic (50%) than did GSPCA staff (20%, Table 1). In addition, at the beginning of the survey, 90% of dog caregivers responded that they had heard about heartworm (1st question); however, later in the survey, 100% of dog caregivers thought that heartworm prevention was vital (5th question) and that heartworm could be deadly to dogs if untreated (10th question). It is possible that after the 1st survey question, dog caregivers were more likely to perceive that heartworm was serious and answered accordingly in later questions. These results provide evidence that written knowledge would benefit the dog caregivers, who are receptive to considering the dangers of heartworm and who want more information about heartworm. GSPCA staff could also benefit from written information to educate dog caregivers as well as increase their own awareness of heartworm, including zoonotic concerns.

It is important to note that cultural attitudes in Grenada may also contribute to the lack of canine heartworm awareness and prevention. Many Grenadians do not consider dogs as companion animals or family members, but as guards for property and families and, occasionally, as pests (Grenadian dog caregivers, personal communications, June 1–August 21, 2013). In some areas, it is even common for dogs to be “owned” by the community and not by individuals, which can result in no one taking responsibility for health care (B. Nyack, personal communication, May 1, 2010).

It is important to note that GSPCA staff and Grenadian dog caregivers using the GSPCA clearly demonstrated that caregivers do care for their dogs. However, many Grenadian dog caregivers may feel that heartworm prevention is not one of their priorities. Even in the surveys from this research project, 22.2% of GSPCA staff and 10.8% of Grenadian dog caregivers felt that dog caregivers do not provide heartworm prevention due to a lack of interest (Figure 1C). It is very likely that deficiencies in heartworm awareness and prevention are even more evident among the general Grenadian dog caregiver population than the results of these surveys indicate, given cultural attitudes, problems reaching facilities, lack of access to educational materials, and difficulties paying for veterinary care (Thomas, Delgado, Louison, Lefrancois, & Shaw, 2013).

It is promising that in Grenada, attitudes toward dogs and other companion animals are changing through increased education and resources, as well as increased emphasis on nonhuman animal welfare. Many veterinary needs are being addressed by both the GSPCA and SGUSVM. For example, GSPCA staff members visit Grenadian elementary schools to educate
children about the importance of proper care and treatment of companion animals (GSPCA staff, personal communication, September 24, 2013). Collaborations between the SGUSVM and the Government of Grenada are promoting both rabies awareness and vaccinations (Thomas et al., 2013; Zieger & Wisely, 2013). The SGUSVM also has a small animal clinic (St. George’s University, 2013) and hosts mobile One Health community clinics to provide education on and veterinary care to companion animals in multiple parishes (St. George’s University, 2007).

CONCLUSION

As a direct result of findings from the study presented here, a pamphlet on canine heartworm, specifically for Grenadian dog caregivers, was developed and is now available at the GSPCA. The pamphlet not only provides basic knowledge about canine heartworm and the cost-effectiveness of heartworm prevention, but it also emphasizes the human–companion animal bond through statements and pictures. Future studies will evaluate the effectiveness of this pamphlet and additional educational materials will be developed to promote companion animal health and welfare in Grenada.

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REFERENCES


