Brazilian Journ al of Veterinary Research and Animal Science (2003) 40:13-20
ISSN *printed*: 1413-9596
ISSN *on-line*: 1678-4456

Inquiry of cases of myiasis by *Cochliomyia hominivorax* in dogs (*Canis familiaris*) of the Northern and Western zones of Rio de Janeiro city in 2000

Inquérito sobre os casos de miíase por *Cochliomyia hominivorax* em cães (*Canis familiaris*) das zonas norte e oeste do município do Rio de Janeiro no ano 2000

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Summary

An inquiry about cases of myiasis by *C. hominivorax* larvae on dogs presented to 190 veterinary establishments of Rio de Janeiro City in 2000 was performed to contribute to the comprehension of epidemiological features of this myiasis. Cases of screwworm infestation were observed in 184 veterinary establishments: in 104 among 108 establishments of the Northern Zone, and in 80 of 82 establishments of the Western Zone of the city. Most infested dogs were adult, pure breed, long and dark-haired, living in houses, while no preference for sex was observed. Ears were most infested, and the main cause of lesions that led to myiasis was otitis. Screwworm infestation is a very frequent disease on dogs, and prevention programs should be developed, specially during hot weather months (December and January), when incidence was higher. Most infested dogs are the ones that need more care, and prevention of all possible causes of myiasis will help its avoidance. Dirt and lack of hygiene are also causes of screwworm infestation and must be avoided, as other myiasis causes. Pet owners negligence is a contributing factor to the appearance of screwworm infestation on dogs, and pet owners should receive orientation from veterinary clinicians. Additional studies about screwworm infestation on dogs should be performed, in order to identify more predisposing factors to be used in prevention programs.

Key-words
Dog.
Myiasis.

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Received: 16/01/2002
Accepted: 21/12/2002

Introduction

Cochliomyia hominivorax (Coquerel, Calliphoridae)[1,2] is a primary screwworm that invades fresh and uncontaminated skin wounds[3], producing a condition called myiasis, that is the infestation of live vertebrate animals with dipterous larvae[4,5,6]. Larvae may develop in the subcutaneous tissues of the skin or

organs[3]. In Brazil, this myiasis is known as "bicheira"[6]. Adult female flies are attracted to fresh skin wounds on any warm-blooded animal, where they lay their eggs[3], and wide lesions are produced[7], which have an unpleasant odor[1,3,6]. The host becomes unquiet, stops feeding and looses weight, and death can occur due to toxemia, hemorrhage or secondary bacterial infections[1]. *C. hominivorax* occurs mainly in tropical areas[6] and it is the most important myiasis-producing fly in man and domestic animals of America, from southern United States to northern Chile[1]. The first register of *C. hominivorax* occurred in 1858, in French Guyana, by Coquerel[8]. In Libya, the fist registers were described by El-Azazy[9], and in France the first case of auricular myiasis in a dog (brought from Brazil) was described by Chermette, Prigent and Bourdeau[10]. Diagnose is made by fistula and larvae observation[11]. In dogs, successfully prevention of myiasis was reported with the use of lufenuron (10 mg/kg, oral, once a month)[12]. Doramectin was effective in preventing natural infestations by *C. hominivorax* in cattle after castration[13], but there are no studies in dogs.

An inquiry about the cases of myiasis by *Cochliomyia hominivorax* larvae in dogs presented to veterinary establishments of the Northern and Western Zones of Rio de Janeiro City in 2000 was performed, so we can contribute to the comprehension of the epidemiological features of this myiasis, which causes extreme annoyance of the affected animals and can lead to death[1, 3].

Material and Method

In January 2001, formularies were distributed to 190 veterinary establishments of the Northern and Western Zones of Rio de Janeiro City, so the veterinary clinicians could answer questions about epidemiological features of the cases of myiasis by *C. hominivorax* larvae in dogs observed in 2000. Questions referred to incidence of cases during 2000, phenotypical features of infested dogs (breed, hair color, hair size, sex, and age), infested body regions, causes of lesion that led to myiasis, and type of domicile that infested dogs lived in.

This inquiry included 108 veterinary establishments of the Northern Zone of Rio de Janeiro City, in the districts of Acari (one veterinary establishment), Andaraí (4), Bancários (1), Bento Ribeiro (2), Bonsucesso (1), Brás de Pina (2), Cachambi (4), Cacuia (1), Campinho (1), Cascadura (1), Cavalcante (1), Cocotá (1), Coelho Neto (1), Engenho de Dentro (1), Engenho Novo (4), Grajaú (2), Guadalupe (1), Higienópolis (1), Inhaúma (1), Irajá (3), Jabour (1), Jacaré (1), Jardim América (1), Jardim Guanabara (1), Lins de Vasconcelos (3), Madureira (2), Maracanã (2), Marechal Hermes (1), Maria da Graça (1), Méier (9), Moneró (1), Olaria (2), Pavuna (2), Penha (3), Penha Circular (2), Piedade (4), Pilares (1), Praça da Bandeira (1), Ramos (2), Riachuelo (2), Rio Comprido (3), Rocha Miranda (3), São Cristóvão (1), Tijuca (8), Tomás Coelho (1), Usina (2), Vaz Lobo (1), Vicente de Carvalho (1), Vila da Penha (2), Vila Isabel (7), Vila Kosmos (1), Vista Alegre (1), and Zumbi (1).

In the Western Zone, 82 veterinary establishments were included, in the districts of Anil (one veterinary establishment), Bangu (4), Barra da Tijuca (20), Campo Grande (17), Freguesia (7), Paciência (2), Padre Miguel (1), Pechincha (4), Pedra de Guaratiba (1), Praça Seca (3), Realengo (5), Recreio dos Bandeirantes (3), Santa Cruz (2), Sepetiba (1), Sulacap (2), Tanque (1), Taquara (4), and Vila Valqueire (4).

Results and Discussion

Cases of screwworm infestation on dogs were presented to 184 (97.00%) of 190 veterinary establishments included in this inquiry: 104 (96.00%) among 108 establishments in the Northern Zone, and 80 (98.00%) among 82 establishments in the Western Zone of Rio de Janeiro City. Our results disagree with Scott , Miller and Griffin[7], who described that myiasis are not common in dogs and cats. Some forests exist in the Northern and Western Zones, and cattle, horses, and even pigs can be found in some areas, because the existence of slums in the Northern Zone, which is predominantly urban, and the existence of some rural areas in the Western Zone, where poor people can be seen, as in the Northern Zone. These conditions created an adequate environment to flies proliferation and, then, to appearance of myiasis on dogs. It is necessary to correct handling and hygiene of the place where the dogs are kept, what is recommended by Foil[14].

In the Northern Zone, only 1.00% (of 104) of the clinicians reported higher incidence in cats than in dogs, while 99.00% described that dogs were more infested than cats. 32.00% of the clinicians reported highest incidence in December, 20.00% January, 5.00% February, 5.00% March, 5.00% November, 3.00% October, 2.00% April, 1.00% May, 1.00% July, and 1.00% August, while 13.00% answered that no month had higher incidence than another, and 12.00% did not know to answer (Table 1). According to 99.00% of the clinicians, most infested dogs lived in houses (Table 2), while 1.00% mentioned the stray dogs that lived in the streets.Pure breed dogs were most infested according to 48.00% of the clinicians (Table 2). Among the 50 clinicians who answered that, 78.00% mentioned the German Shepherd. Incidence was the same for both pure breed and dogs of mixed breeding according to 30.00% of the clinicians, and dogs of mixed breeding were the most affected according to 22.00%. Long-haired dogs were mentioned as the most infested by 56.00% of the clinicians (Table 2), whereas 17.00% answered that the incidence was higher in dogs with short hair, 11.00% mentioned the medium-haired dogs, 13.00% did not notice any predilection for hair size, and 3.00% did not know to answer the question. Besides, 68.00% of the clinicians reported that dogs with dark hair were the most affected (Table 2), whereas 6.00% mentioned light hair, 19.00% did not observe higher incidence in dogs with dark or light hair color, and 7.00% did not know to answer this question. No predilection for sex was reported by 49.00% of the clinicians (Table 2), 36.00% mentioned that males were the most infested, and 2.00% females. However, 13% did not know to answer this question. Adult dogs were the most infested according to 59.00% of the clinicians (Table 2), old dogs according to 35.00%, puppies according to 2.00%, and 3.00% answered that no predilection for age was observed, while 1.00% did not know to answer this question.

Ears were the most infested body regions, as reported by 59.00% of the clinicians, while 14.00% mentioned perianal region, 6.00% lumbar region, 6.00% limbs, 2.00% mouth, 2.00% neck, 2.00% dorsum, 2.00% genital region, 1.00% head, 1.00% thorax, and 1.00% fingers, while no predilection for body region was reported by 4.00% of the clinicians (Table 3). Otitis was mentioned by 58.00% of the clinicians as the most frequent cause of lesion that led to myiasis, dermatitis by 17.00%, unknown cause by 9.00%, perianal sacs inflammation by 6.00%, fights by 3.00%, trampling by 1.00%, tartar by 1.00%, dirt and lack of hygiene by 1.00%, genital secretion by 1.00%, and post parturition by 1.00%, while 2.00% did not notice any cause of lesions more frequent (Table 4).

In the Western Zone, incidence

Table 1
Mentioning frequency by veterinary clinicians about the months of highest incidence of myiasis by *C. hominivorax* larvae on dogs presented to veterinary establishments of the Northern and Western Zones of Rio de Janeiro City in 2000

MONTH	MENTIONING FREQUENCY BY VETERINARY CLINICIANS (%)	
	Northern Zone	Western Zone
December	32	31
January	20	20
No month	13	13
Did not know to answer	12	13
Hot weather months	0	10
November 5	8	
March	5	1
October	3	2
February	5	0
April	2	0
August	1	1
May	1	0
June	0	1
July	1	0

Table 2
Mentioning frequency by veterinary clinicians about dogs presenting *C. hominivorax* larvae infestation and presented to veterinary establishments of the Northern and Western Zones of Rio de Janeiro City in 2000

DOGS	MENTIONING FREQUENCY BY VETERINARY CLINICIANS (%)	
	Northern Zone	Western Zone
Pure breed	48	44
Adult	59	54
Long-haired	56	51
Dark-haired	68	58
No preference for sex	49	58
Living in houses	99	83

Table 3
Mentioning frequency by veterinary clinicians about most infested body regions in dogs presenting *C. hominivorax* larvae infestation and presented to veterinary establishments of the Northern and Western Zones of Rio de Janeiro City in 2000

BODY REGION	MENTIONING FREQUENCY BY VETERINARY CLINICIANS (%)	
	Northern Zone	Western Zone
Ears	59	45
Perianal region	14	8
Lumbar	6	9
Limbs	6	10
No preference	4	1
Mouth	2	6
Neck	2	0
Dorsal	2	10
Genital region	2	4
Pinna	0	4
Fingers	1	1
Head	1	0
Thorax	1	0
Mammary glands	0	1
Did not know	0	1

Table 4
Mentioning frequency by veterinary clinicians about the causes of lesions that led to myiasis by *C. hominivorax* larvae in dogs presented to veterinary establishments of the Northern and Western Zones of Rio de Janeiro City in 2000

CAUSES	MENTIONING FREQUENCY BY VETERINARY CLINICIANS (%)	
	Northern Zone	Western Zone
Otitis	58	45
Dermatitis	17	15
Unknown	9	10
Fights	3	12
Perianal sacs inflammation	6	6
Tartar	1	4
Did not know to answer	1	3
Post parturition	1	3
Genital secretion	1	1
No cause more frequent	2	0
Dirt and lack of hygiene	1	0
Trampling	1	0
Ulcerated tumor	0	1
Pododermatitis	0	1

was higher in dogs than in cats according to 94.00% (of 80) of the clinicians, and higher in cats than in dogs according 4.00%, while 1.00% reported that dogs and cats were equally affected, and 1.00% did not answered the question. 31.00% of the clinicians mentioned highest incidence in December, 20.00% January, 8.00% November, 2.00% October, 1.00% March, 1.00% June, and 1.00% August, while 13.00% reported that no month had higher incidence than another, 13.00% did not know to answer, and 10.00% reported that incidence was higher during the hot weather months of the year but did not mention any particular month (Table 1). Most infested dogs lived in houses, as reported by 83.00% of the clinicians (Table 2), while 10.00% reported small farms, 4.00% apartments, and 1.00% the stray dogs that lived in the streets. However, 1.00% did not notice predilection for houses, small farms or apartments, and 1.00% did not answered the question. Houses and small farms are very common in the Western Zone.

Incidence was higher in pure breed dogs according to 44.00% of the clinicians (Table 2). Among the 35 clinicians who answered that, 60.00% mentioned German Shepherds, 6.00% mentioned Poodles, 5.00% Boxers, 5.00% Dobermans, and 5.00% mentioned English Cocker Spaniels. According to 34.00% of the clinicians, incidence was the same for pure breed and mixed breeding dogs, and 21.00% described that mixed breeding dogs were the most affected. According to 51.00% of the clinicians, long-haired dogs were the most infested (Table 2), while 20.00% did not notice any predilection for hair size, 15.00% mentioned the medium-haired dogs, 13.00% mentioned dogs with short hair, and only 1.00% did not answer the question. Besides, 58.00% of the clinicians reported that dogs with dark hair were the most affected (Table 2), while 31.00% did not notice predilection for hair color, 7.00% mentioned light hair, and 4.00% did not know to answer this question.

According to 58.00% of the clinicians, there was no predilection for sex (Table 2), but 24.00% reported that males were the most infested, and 11.00% females, whereas 7.00% did not answer the question. It was reported by 54.00% of the clinicians that adult dogs were the most infected (Table 2), by

34.00% old dogs, and 11.00% described no predilection for age, whereas only 1.00% did not know to answer the question.Most infested body regions were the ears, according to 45.00% of the clinicians. Dorsal region was mentioned by 10.00%, limbs also by 10.00%, lumbar region by 9.00%, perianal region by 8.00%, mouth by 6.00%, pinna by 4.00%, genital region by 4.00%, mammary glands by 1.00%, and fingers by 1.00%. No preference for body region was noticed by 1.00% of the clinicians, while 1.00% did not know to answer (Table 3). Otitis was described by 45.00% of the clinicians as the most frequent cause of lesion that led to myiasis, dermatitis by 15.00%, fights by 12.00%, unknown cause by 10.00%, perianal sacs inflammation by 6.00%, tartar by 4.00%, post parturition by 3.00%, genital secretion by 1.00%, ulcerated tumor by 1.00%, and pododermatitis by 1.00%, while 1.00% did not notice a more frequent cause, and 1.00% did not know to answer (Table 4). One clinician spontaneously reported that ectoparasite infestation is a frequent cause of dermatitis in dogs.

In the Northern and Western Zones of Rio de Janeiro City, most clinicians reported that myiasis by *C. hominivorax* larvae was more common in dogs than in cats during 2000, data also obtained by Ribeiro et al.[15]in the Western Zone and by Ribeiro et al.[16] in the Central Zone of the city, both during the same period. It can be influenced by the fact that dogs are the most presented pets to veterinary establishments in Rio de Janeiro City, because they are more populous than cats. Besides, dogs are maintained in house yards more often than cats, specially the large breed dogs used for house guard, and because of this they are more exposed to flies than cats.

German Shepherd is a very popular breed in Rio de Janeiro City and, as it is a large breed, often kept in house yards. Frequently, adults are also maintained in yards, many times for house guard, while puppies are kept indoors. As flies can easily access yards, large breed and adult dogs are more exposed to flies and, then, to myiasis. In this inquiry, German Shepherd was considered a long and dark-haired breed, and dogs with such features were the most infested according to greatest part of the clinicians. Poodles and English Cockers Spaniels are also very popular in Rio de Janeiro City, and they are long-haired. These three breeds present otitis very often. This disease was mentioned by most clinicians as the main cause of lesions that led to myiasis, what explains why ears were the body regions most infested. So, otitis prevention, as well the prevention of others causes mentioned, will help myiasis avoidance.

Some information were spontaneously given by clinicians and contributed to our conclusions. Myiasis is seen as a consequence of the owner negligence[7, 14], and it was mentioned by clinicians that carelessness by owners is an important factor to the appearance of myiasis in dogs. This negligence happens very often with long-haired dogs kept in yards for house guarding, and it would be, in part, responsible by the uniform occurrence of myiasis during the year. Another clinician reported that old dogs are predisposed to myiasis because they spend much time sleeping, what makes easier the approach of flies.

Some clinicians did not know to answer to the questions of our inquiry, because they could not remember data referred to them. Besides, we noticed a lot of differences when comparing the answers given by some clinicians, despite the nearness among their veterinary establishments in some cases. We also noticed that many clinicians did not consider myiasis as a disease of great importance, probably because it is common in dogs of the Northern and Western Zones of Rio de Janeiro City, as concluded in this inquiry, and it is not necessary to report the cases to authorities, as in the United States, where

screwworm infestation must be reported to state and federal authorities[3]. In Brazil there are 27,000,000 dogs living with owners[17]. Although dogs and cats are usually seen as family members and offer psychological, physiologic and social benefits to humans[18], Ribeiro et al.[15], who studied the incidence of myiasis in cats of the Western Zone of Rio de Janeiro City, did not found any similar study performed in Rio de Janeiro City.

Conclusions

Screwworm infestation is a very frequent disease on dogs, and prevention programs should be developed, specially during hot weather months, when incidence of screwworm infestation is higher. Most infested dogs — adults, pure breed, dark and short-haired, living in houses — are the ones that need more care.

As pet owners negligence is a contributing factor to the appearance of screwworm infestation on dogs, pet owners should receive orientation from veterinary clinicians. Prevention of all possible causes of myiasis will help its avoidance. When it is not possible — as in case of unknown causes — lesions must be adequately treated in order to avoid *C. hominivorax* larvae developing from eggs. Besides, if pet owners are warned that some body regions can be infested more frequently, they can be more careful. They should know that dirt and lack of hygiene are also causes of screwworm infestation and must be avoided, as other myiasis causes.

Additional studies about screwworm infestation on dogs should be performed, in order to identify more predisposing factors and use this information in prevention programs.

Acknowledgements

We would like to thank the Veterinary Medicine Regional Council of Rio de Janeiro City (CRMV-RJ) for providing the list with addresses of the veterinary establishments of the city. Thanks also go to veterinary clinicians that answered our formularies.

Resumo

Foi realizado um inquérito sobre os casos de miíases por larvas de *C. hominivorax* (bicheira) em cães atendidos em 190 clínicas e consultórios veterinários do Município do Rio de Janeiro em 2000, para contribuir na compreensão das características epidemiológicas dessa doença. Casos de miíase foram atendidos em 184 estabelecimentos veterinários: em 104 de 108 estabelecimentos da Zona Norte e em 80 de 82 estabelecimentos da Zona Oeste do município. Os cães mais acometidos foram os adultos, de raça definida, com pelagem longa e escura, que residiam em casas, sem predileção por sexo. Os ouvidos foram as regiões do corpo mais afetadas e a principal causa de lesão que levou à miíase foi a otite. As miíases são comuns em cães e, assim, programas preventivos devem ser desenvolvidos, principalmente nos meses quentes (dezembro e janeiro), quando a incidência foi maior. Os cães mais infestados são os que necessitam de maiores cuidados e a prevenção de todas as possíveis causas de miíase auxiliará na prevenção da mesma. Sujidades e falta de higiene também são causas de miíase e devem ser evitadas, assim como as outras causas. A negligência dos proprietários é um fator que contribui para o aparecimento de miíases em cães e os proprietários devem receber orientações por parte dos veterinários. Mais estudos sobre miíases em cães devem ser realizados para identificar mais fatores predisponentes a serem utilizados nos programas preventivos.

Palavras-chave:
Cão.
Miíases.

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