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Internal and External Parasitic Infections of Equines In South Darfur State, Western Sudan

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Abstract

In a retrospective study of 20 years, 6675 horses and donkeys were examined for different diseases and this study was focused on internal and external parasitic infections. Of the 6675 equines examined, 3275 (49.1%) were infected with different diseases and the rest were physical, nutritional or undiagnosed cases. The parasites infected 2887 (88.2%) of the 3275 diseased animals and 43.3% of the equines examined. The infections were solely or associated with other diseases. The parasites found in the equines were: strongyles (37.8%), strongyloides sp. (1.7%), *Oxyuris equi*(1.6%), *Parascaris equarum*(1.59%), mange mites(0.4%), *Anopolocephala* sp. (0.75%) and Coccidia like species (0.06%). Fungal infections which infected 39(0.58%)of the equines were diagnosed concomitantly with the external parasites. The common ticks collected from the horses and donkeys were *Hyalomma* spp. *Amblyomma lepidum*, *Boophilus* and *Rhipicephalus* spp. The common flies associated with the equines, were from the genera *Musca*, *Tabanus*, *Stomoxys*, *Gasrtophilus*, *Haematobia*, *Anopheles*, *Culex*, *Culicoides*, *Aedes*, *Hippobosca*, *Lucelia*, *Phlebotomus* and in southern areas of South Darfur, *Glossina* and *Simulium.* Monthly mean incidents showed that the infections occurred throughout the year, but their peak levels were in summer (March to June) and late rainy seasons (September to November) for reasons discussed. Medicines which were used for treatment of the infected equines were reviewed and protocols for treatment and control of parasites in equines were suggested. Infections with blood parasites will be dealt with in a separate paper.

المستخلص

فى دراسة تناولت أمراض الفصيلة الخيلية فى ولاية جنوب دارفور ولمدة عشرون عاما قى الفترة من 1982 وحتى 2002. من جملة 6675 حيوان تم فحصها، وجد أن 3275 (49.1%) كانت مصابة بالامراض المختلفة بينما كان المتبقى هو حالات ناتجة عن اختلالات وظيفية أو غذائية أو حالات لم يتم تشخيصها وكان عدد المصاب منها باالطفيليات الداخلية والخارجية 2887 (88.2%). وكانت الاصابات اما منفردة أو مرتبطة بامراض أخرى. كانت الطفيليات التى تم تشخيصها هى: ديدان استرونقيلس (37.8%)،

استرونقيليدس (1.7%)، أوكسيرس ايكوى (1.6%)، باراسكاريس ايكوريم (1.6%)، قمل الجرب (0.4%)، ديدان الأنابلوسيفلا (0.7%) و الكوكسيديا (0.1%). تم تشخيص الاصابات الفطرية وتضمينها فى الاصابات الطفيلية الخارجية والتى شخصت فى 39 (0.5%) من الحيوانات التى فحصت. تم جمع أنواع من القراد من بعض الخيول و الحمير و هى أنواع الهايلوما، الأمبيلوما لبيدم، البوفيلس و الريسبفلس. أما الحشرات التى وجدت مع الخيول والحمير فهى أنواع المسكا، التابانس، الاستموكسس، القاستروفيلس، الهيماتوبيا، الأنوفيلس، الكيولكس، الأيدس، الهيبوبسكا ليوسليا، الفلبوتمس وفى المناطق الجنوبية من جنوب دارفور وجدت القلوسيانا والسيمليوم. المتوسط الشهرى للاصابات بالطفيليات وضح انها تحدث على مدار العام ولكنها تصل الى اعلى مستوى لها فى الصيف (من مارس حتى يونيو) وفى آخر فصل الخريف (من سبتمبر حتى نوفمبر) وذلك لأسباب تمت مناقشتها. تستخدم العديد من الأدوية لمعالجة الحيوانات المصابة، وقد تم اقتراح برامج للعلاج والسيطرة على الاصابات الطفيلية فى الخيول والحمير..

Introduction

Darfur Region is the major horses and donkeys breeding area in the Sudan. The population of the two species in South Darfur State where this study was carried out was estimated to range between 2- 3 million head. The equines are bred by sedentary and nomadic people in the state. They are used by the poor for transport, pulling carts, ploughing agricultural lands and other economical interests (Fig. 1). Besides, horses are used for recreation and looking after cattle.

Fig. 1: Donkeys are used for different economical purposes by the poor

The equines are grazed on common fields (Fig.2) with other species and/ or fed with hay collected from them.

This study was to investigate retrospectively into internal and external parasites of equines and their treatment in South Darfur State, Western Sudan from 1982 – 2002.

Fig. 2: Donkeys on a common pasture land.

Materials and Methods

Six thousand six hundred and seventy five horses and donkeys presented to Nyala Veterinary Clinic, South Darfur State from 1982 to 2002 were examined for different diseases using conventional laboratory methods. The parasites were diagnosed by examination of rectal faecal samples, using improved modified McMaster method and saturated sodium chloride and the external parasites by examination of skin scrapings mounted in potassium hydroxide for mange mites. Fungal infections encountered during the examinations of the mounted specimens were included in the study. In both conditions, methods described in the Manual of Veterinary Investigation Laboratory Techniques (Anon, 1984) were used. Worm eggs were identified to generic level according to their morphology as provided by Solusby (1982). The *Oxyuris*

equi was identified to the species level by its characteristic morphological appearances. Larvae of *Gasrtophilus* species were identified by the presence of reddish bots in stomachs of equines at post-mortem examinations. Ticks were collected in 70% alcohol and sent to the Central Veterinary Laboratory, Soba, Khartoum for identification. House, stable and other flies were identified by their characteristic appearances in the Department of Tsetse and Trypanosomosis, Nyala Veterinary Research Laboratory. Medicines used for the treatment of internal and external parasites of equines were reviewed and recommendations for their control were made.

Results

Clinical findings:

Internal parasites:

Different internal parasites were diagnosed during the course of the study. The common clinical signs of the infestations of horses and donkeys with the internal parasites were loss of hair, debilitation, diarrhoea, fever, loss of appetite, depression, dehydration, cough, constipation and worms attached or their remnants on anuses in some cases. These manifestations were exhibited variably in the different horses and donkeys depending on the types of worms. In cases of strongyle infections, typical clinical findings were emaciation, colic and seldom cold lameness. *Oxyuris equi* were seen attached to the mucous membranes of the rectum and caused anal prolapses (Fig.3). At the post-mortem examinations of four donkeys, larvae of *Gasrtophilus* were found in masses attached on the mucous membranes of their stomachs

Fig. 4 shows a horse with a long hair and a poor body condition infected with internal parasites feeding on soiled grasses.

Fig. 4: A horse with long hair and a poor body condition feeding on soiled grasses

External parasites:

Demodectic and *Psarcoptic* mange mites were diagnosed in the equines. They caused localized and generalized skin infections and resulted in loss of hair and poor body conditions. Fig. 5 shows an emaciated horse with a generalized skin infection caused by *Demodectic* mange mites.

Fig. 5: A horse infected with *Demodectic* mange mites.

Fungal infections:

Thirty nine (1.2%) of the 3275 infected cases and 0.6% of the 6675 equines were infected with fungi exhibited by skin lesions and presence of fungal spores upon examination of the skin scrapings. Fig. 6 shows a donkey with a generalized skin infection due to a fungal infection.

Fig. 6: A donkey with a generalized skin infection due to a fungal infection.

Prevalence of parasitic diseases:

Of the 6675 equines, 2525 (37.8%) were infected with strongyles; 116 (1.7%) with strongyloides; 107 (1.6%) with *Oxyuris equi*; 106 (1.59 %) with *Parascaris equarum*; 24 (0.4%) with mange mites; 5 (0.075%) with *Anopolocephala magna* and 4 (0.06%) with Coccidia like organisms.

Parasitic diseases in relation to other infections:

Of the 3275 diseased equines, 2525(77.1%) were infected with strongyles; 116 (3.5%) with strongyloides sp.; 107 (3.3 %) with *Oxyuris equi*; 106 (3.2%) with *Parascaris equarum*; 24 (0.73%) with mange mites; 5 (0.07%) with *Anopolocephala magna* and 4 (0.06%) with Coccidia like species.

Annual prevalence of internal and external parasites:

Table 1 summaries annual prevalence of internal and external parasites from 1982 to 2002.

Fig. 7 compares the annual prevalence of the different internal and external parasites. As shown in the figure, strongyle infections were 2525 (87.5%) of the 2887 parasitic infections, and the other parasites were 362 (12.5%) of the total.

Parasitic burdens in horses and donkeys:

Table 2 compares parasitic loads and pack cell volumes of 10 horses and 10 donkeys. As shown in the table, donkeys had heavier parasitic burden and lower PCV values than the horses. Fig 2 shows donkeys left abandoned in a common pasture land feeding on scarce grasses.

Monthly mean incidences of the different parasitic infections in 20 years:

Monthly mean incidences of parasitic infections for the 20 years are presented in Fig. 8. Infections with the parasites occurred throughout the year, but the highest incidence occurred from March to June (summer months) and September to November (late rainy and early winter months).

Ticks and flies collected or found around the equines:

Ticks collected from horses and donkeys were mainly *Hyalomma* spp. *Amblyomma lepidum*, *Boophilus* and *Rhipicephalus* spp.

Common flies in the pastures and stables of horses and donkeys were species of the genera:

Table 1: Annual prevalence rates of internal and external parasites in equines examined during 1982-2002

	Total equines examined	Total No. infected(%)	Strongylus(%)	Oxyuris(%)	Parascaris(%)	Strong-yloides(%)	Fungal infection(%)	Mange mites(%)	Anaplo-cephala(%)	Coccidia(%)
1982	293	192 (65.5)	150 (51.1)	12 (4.1)	5 (1.7)	6 (2.1)	1 (0.3)	0 (0.0)	0 (0.0)	0 (0.0)
1983	251	211 (84.1)	164 (63.3)	16 (6.4)	2 (0.8)	11 (4.4)	0 (0.0)	9 (1.2)	0 (0.0)	0 (0.0)
1984	110	66 (60.0)	52 (47.3)	3 (2.3)	0 (0.0)	1 (0.9)	0 (0.0)	1 (0.9)	0 (0.0)	0 (0.0)
1985	124	85 (68.5)	67 (54.0)	1 (0.8)	2 (1.8)	6 (4.8)	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.8)
1986	191	120 (62.8)	91 (47.6)	4 (2.1)	1 (0.5)	6 (3.1)	1 (0.5)	0 (0.0)	0 (0.0)	0 (0.0)
1987	63	26 (41.3)	25 (39.7)	0 (0.0)	0 (0.0)	2 (3.2)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
1988	60	27 (45.0)	22 (36.7)	8 (13.3)	0 (0.0)	4 (6.7)	1 (1.7)	0 (0.0)	0 (0.0)	0 (0.0)
1989	134	80 (59.7)	57 (42.5)	2 (1.5)	0 (0.0)	0 (0.0)	7 (5.2)	1 (0.7)	0 (0.0)	1 (0.7)
1990	115	63 (54.8)	52 (82.5)	0 (0.0)	0 (0.0)	1 (0.9)	2 (1.7)	1 (0.9)	0 (0.0)	1 (0.9)
1991	478	175 (36.6)	107 (22.4)	2 (0.5)	0 (0.0)	10 (2.1)	9 (1.9)	0 (0.0)	0 (0.0)	0 (0.0)
1992	469	129 (27.5)	97 (75.2)	5 (1.1)	5 (1.1)	6 (1.3)	0 (0.0)	3 (0.9)	0 (0.0)	0 (0.0)
1993	349	109 (31.2)	53 (15.2)	4 (1.1)	7 (2.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
1994	102	57 (55.9)	31 (30.1)	1 (0.9)	0 (0.0)	1 (0.9)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
1995	224	106 (47.3)	87 (38.8)	0 (0.0)	1 (0.2)	8 (3.6)	4 (1.9)	1 (0.4)	0 (0.0)	0 (0.0)
1996	552	353 (63.9)	301 (54.5)	4 (0.7)	20 (3.6)	16 (2.9)	1 (0.2)	1 (0.2)	3 (0.5)	0 (0.0)
1997	450	283 (62.9)	216 (48.0)	5 (1.1)	14 (3.1)	6 (1.6)	2 (0.4)	3 (0.7)	1 (0.2)	0 (0.0)
1998	636	321 (50.5)	255 (40.1)	13 (2.0)	31 (4.9)	3 (0.5)	1 (0.7)	0 (0.0)	0 (0.0)	1 (0.7)
1999	766	329 (43.0)	263 (34.3)	22 (2.2)	40 (5.2)	12 (1.6)	2 (0.3)	3 (0.4)	0 (0.0)	0 (0.0)
2000	593	237 (40.0)	170 (28.7)	1 (0.2)	10 (1.7)	8 (1.3)	1 (0.2)	1 (0.2)	0 (0.0)	0 (0.0)
2001	482	195 (40.5)	150 (31.1)	2 (0.4)	12 (2.5)	3 (0.6)	2 (0.4)	6 (1.2)	0 (0.0)	0 (0.0)
2002	375	157 (41.9)	115 (30.7)	2 (0.5)	10 (2.7)	6 (1.6)	3 (0.8)	0 (0.0)	1 (0.3)	0 (0.0)

Table 2: Comparison between parasitic load and PCV values of 10 horses and 10 donkeys

Horses			Donkeys		
No. of horses	Egg/gram faeces	PCV volume	No. of donkeys	Egg/gram faeces	PCV volume
1	2,000	21%	1	7,000	29%
2	4,000	31%	2	18,000	27%
3	5,000	32%	3	9,400	25%
4	2,100	26%	4	6,500	15%
5	2,800	36%	5	10,000	19%
6	3,700	NA	6	9,000	NA
7	3,800	23%	7	5,600	NA
8	2,700	29%	8	8,900	22%
9	3,600	22%	9	7,600	26%
10	12,600	30%	10	15,500	23%
Means	4,230	27.8%	Means	9,750	23.6%

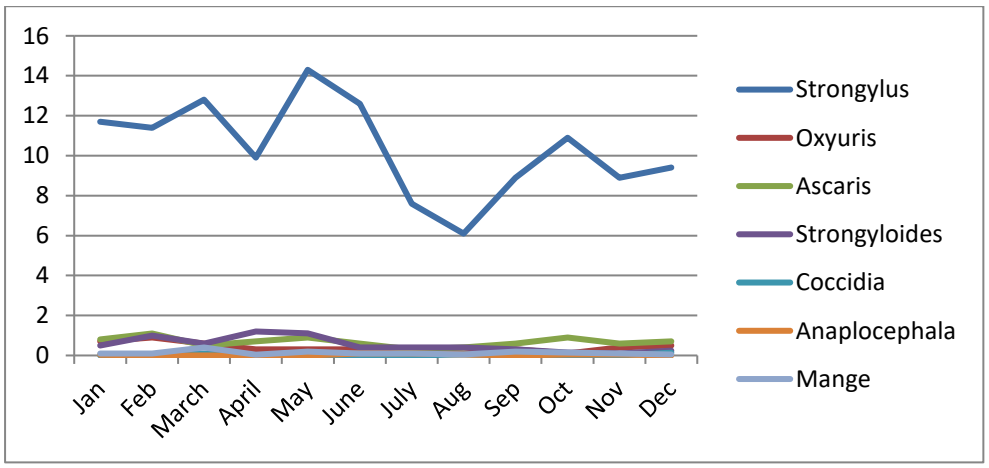

Fig. 8: Monthly mean incidences of parasitic infections for 20 years

Musca, *Tabanus*, *Stomoxys*, *Gasrtophilus*, *Haematobia*, *Anopheles*, *Culex*, *Culicoides*, *Aedes*, *Hippobosca*, *Lucelia*, *Chrysops*, *Phlebotomus* and in southern areas of South Darfur, *Glossina* and *Simulium*. In some localities in South Darfur State *Gasrtophilus* files were seen irritating donkeys in villages and watering points. In nomadic areas South of Latitude 10°C, Tse tse flies mainly *Glossina morsitans morsitans*, *Stomoxys* and *Tabanus* spp. and other haematophagous flies were the common biting flies of equines especially those of the nomads and poachers.

Treatment and control of internal parasites of equines:

Till early eighties, phenothiazine derivatives under the trade names of Phenovis (ICI) and later Phenomine were widely used for treatment of internal parasites in equines. They were indicated against adult strongyles. The drugs had some limitations and drawbacks and were subsequently withdrawn. In the same, period Thiabendazole preparation for equines, Equizole, supplied by Merck Sharp and Dome for treatment of large and small strongyles, pin and thread worms was used. Then a broad spectrum organic phosphorus compound (OPC) the dimethy ester of phosphoric acid under the trade mark Neguvon (Bayer) was also used for treatment of endoparasites and ectoparastes including *Gasrtophilus* larvae and *Habronema*. In the mid-eighties till now, the ivermection was introduced for treatment of some internal and external parasites of equines. The drug was used in equines because it was stated to be specially highly effective against arterial stages of *Stronglus vulgaris*, other gastrointestinal nematodes, bots and some ectoparasites. The paste preparations were uncommon and instead injectable forms prepared by different companies were used in spite of the side effects they cause like swellings. In one instance the diameter of such a swelling measured 17cm. Such swellings usually subsided without further noticeable complications. In recent years the paste preparations were made available but still people in remote areas use injectable forms of the medicine.

Some owners under certain circumstances did not use ivermectin because it was expensive and they could not afford it and as a result used Tetramesole preparations in the wettable powders or injectable forms (Fatro, SPA, Italy). A considerable number of equine owners routinely used Benzimidazole compounds like Albendazole in the form of suspensions and boluses and found it effective against some gastrointestinal parasites. Nicolsamide (ICI) was rarely made available but was used for treatment of tape worms in equines.

For external parasites, other than Neguvon , Ivermectin and Lindane, Benzene hydrochloride 0.19%, were widely used against external parasites including mites, lice and ticks. Asuntol (Coumphos) was also used for treatment of ticks, lice and stable flies. A preparation under the trade mark of MangeZal (Avico, Oman, Jordan) which contained benzyl benzoate, sulfur, salicylic acid, tar and phenol was also used for treatment for the external skin infections.

Discussion

Horses and donkeys are susceptible to many internal and external parasites and the common ones are *Stronglus vulgaris* (*S. vulgaris*), *S.*

endentatus, *S. equines*, *Triodontophrus* spp., small strongyles, *Parascaris equarum*, *Oxyuris equi*, *Trichostrongylus axei*, *Habronema muscae*, *Gasrtophilus* spp., *Oncocerca* spp., *Strongyloides westeri* and *Diactocualus arnfieldi* (Anon, 1985).

The infections with the different parasites depend on geographical locations and management systems. In the Sudan, the common internal parasitic species reported in equines were *S. equi*, *S. endentatus*, *S. vulgaris*, *Triodontophrus serratus*, *Anopolocephala magna*, *Oxyuris equi*, *Habronema megastoma*, *H. muscae*, *Parascaris equarum*, *Gastrodiscus aegptiacus* and *Staraia equi* (Amin *et al.*, 1979).

Fewer parasitic species were identified in this study because investigations were based mostly on examinations of faecal samples rather than post-mortem examinations. Donkeys had the highest parasitical loads than horses because they received less attention than the horses. The PCVs were measured to assess the effects of the parasites on their values.

It was evident that storngyle infections were the most important ones, but medicines used in the past were not effective against arterial stages of the parasites. However, the use of ivermectin enabled to overcome the difficulty. The use of Albendazole preparations assigned for ruminants in equines should be evaluated since Albendazole is a broad spectrum medicine against nematodes, trematodes and cestodes, and since some animal owners use it and observed successful results without noticeable side effects.

It was noticed that equines were heavily infected with internal and external parasites which reached peak levels in certain months of the year. Such infections could have had affected the livelihood of many people.

Parasitic eggs are voided in faeces, develop into infective stages and swallowed by equines or could be conveyed by fly vectors (Anon, 1985). As a result, a solid programme is recommended to control the parasites in equines by their treatment and prevention of contamination of pastures by their medication every 4 – 6 weeks to reduce egg burden in animals and hence prevent pasture contamination.

The ticks and flies associated with equines in the region transmit different diseases including the parasitic ones, and the blood parasites will follow in a subsequent paper.

Adequate and effective drugs for treatment of different parasitic infections in equines should always be made available in Western Sudan.

Grooming and prevention of infected animals to come in contact with healthy ones could assist in control of the parasites. Donkeys should be paid similar attention as horses for well being for the livelihood of their owners.

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