PREVALENCE OF GASTROINTESTINAL HELMINTHS IN SHEEP FROM CENTRAL KORDOFAN, SUDAN

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المستخلص

تم جمع و فحص 498 عينة براز و 45 قناة هضمية للضان من وسط كردفان لدراسةالاصابة بالديدان المعدية المعوية. أوضحت الدراسة أن الاصابة بأكثر من نوع من الديدان هي الأكثرحدوثا و تشكل نسبة 91.1%. كذلك وجد أن الاصابة بالديدان الأسطوانية (الممسودات) هي الأكثر شيوعا بنسبة بلغت 82.2% و أعلى نسبة اصابة هي بدودتي هيمونكس كونتورتس و تريكوسترونجيلس كولبريفورمس بنسب بلغت 68.9% و 60% علي التوالي. أنواع الديدان الأخرى التي تم التعرف عليها هيكوبيريا بيكتناتا، اوسفقستومم كولمبيانم، سترونجيلويدز بابيلوزس، تريكيوريس قلوبيلوزا و اسكرجابينيما اوفس بنسب بلغت 35.1%، 59.2%، 62.2%، 27% و 8.1% علي التوالي. وجدت الديدان الشريطية في 57.8% من القنواتالمعدية المعوية التى فحصت.أما الأنواع التي تم تشخيصها فهي استايليزيا قلوبنكتاتا، افيتلينا سنتربينكتاتا، مونيزيا اكسبانسا و مونيزيا بنديني.كما أن أعلي نسبة اصابة كانت بدودتي استايليزيا قلوبنكتاتا و افيتلينا سنتربينكتاتا بنسبة بلغت 37.8% لكل نوع.
أشارت الدراسة لوجود تأثير موسمي علي الاصابة بالممسودات في الضان و دل علي ذلك أعداد البيض المفرزة و أعداد الديدان. و قد وصل هذان العاملان لأعلى معدل لهما في فصل الخريف.

Key words: Prevalence, gastrointestinal, helminthes, sheep

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Abstract

A total of 498fecal samples and 45 gastrointestinal tracts of sheep from Central Kordofan were examined for gastrointestinal helminths. Mixed helminth infections were found to be common in 91.1% of gastrointestinal tracts examined. Nematode infections were the commonest, reaching 82.2% of the examined animals. *Haemonchus contortus* and *Trichostrongylus colubriformis* were, having the highest prevalence 68.9% and 60%, respectively. Other identified nematode species were *Cooperia pectinata, Oesophagostomum columbianum, Strongyloides papillosus, Trichuris globulosa* and *Skrjabinema ovis*with a frequency of 35.1%, 59.2%, 62.2%, 27% and 8.1, respectively. Cestodes were recovered in 57.8% of the gastrointestinal tracts. The identified species were *Stilesia globipunctata, Avitellina centripunctata, Moniezia expansa* and *Moniezia benedeni*. The most prevalent cestode species were *S. globipunctata* and *A. centripunctata* with a frequency of 37.8% for each species. There was a seasonal effect on nematode infection in sheep as judged by egg output and worm burden. Both parameters showed their highest levels during the rainy season.

Introduction

Sudan has a sheep population estimated to be 47.2 million (AOAD, 1998). This figure comprised 31% of the total population of sheep in the Arab region (AOAD, 1998). Sheep are raised in different parts of the country for their meat, milk and hides. Exports of live sheep and mutton contribute significantly to the national income from foreign exchange exceeding US$ 109 million annually (ARSSC, 1998). Helminthic parasites are known to prevail in the country (El Badawi*et al*. 1978; Atta El Mannan, 1983).

Information about this group of parasites in sheep in this country is relatively scanty. The aim of this study was to provide basic information regarding helminthic parasites. Such information is believed to be essential for planning of any effective control program.

Materials and Methods

Sampling

Fecal samples and whole gastrointestinal tracts were taken from sheep of 1−2 years of age slaughtered at Omdurman Central Abattoir during November 1997−October 1998. These animals were intended for export and, according to the Exporting Companies, they were originated from El Obeid city(Central Kordofan).

Fecal Examination and Fecal Culture

A total of 498 fecal samples were collected directly from the recta of slaughtered sheep. These samples were examined by Willis' technique (Soulsby, 1986) and a standard sedimentation technique. Identification of eggs was performed according to Soulsby (1986) and Thienpant*et al* (1986). Worm egg counts were performed using the modified McMaster technique (Anon, 1977). Samples containing strongyle/trichostrongyle and *Strogyloides papillosus*eggs were subjected to culture. From each sample almost 100 third infective stage larvae (L_3) were identified according to keys by Dunn (1978) and Anon (1977, 1986).

Examination of the Gastrointestinal Tract

A total of 45 intact guts were examined. Double ligatures were applied to separate different organs (rumen, abomasum, small and large intestines). Each organ was separated, placed in a tray, opened with scissors and washed as described by Hansen and Perry (1994). Nematodes were collected, identified and counted using the keys by Dunn (1978), Gibbons and Khalil

(1982) and Soulsby (1986). Cestodes and trematodes were identified as described by Dunn (1978) and Soulsby (1986).

Climatic Data

Meteorological data for the years 1990−1998 for El Obeid city (Central Kordofan) were obtained from the Meteorological Centre in Khartoum. The year is divided into three distinct seasons namely winter (November−February), summer (March−June) and rainy season (July−October).

Presentation of Data

Data presentation was performed using Excel 97 computer program. Number of eggs and worms recovered were transformed to geometric means to normalize the data.

Results

Fecal Examination and Fecal Culture

Fecal examination revealed the presence of strongyle/trichostrongyle eggs throughout the year with the highest prevalence in September 94.3% (Table 1). The frequency of strongyle/trichostrongyle was 61.5%, 22.8% and 70.3% during winter, summer and rainy season, respectively. *Strongyloides papillosus* is prevalent throughout the year and the highest prevalence was in September 75.7% (Table 1). The rate of infection with this parasite was 17.9%, 7.1% and 37.2% during winter, summer and rainy season, respectively.*Trichuris* spp. infection was generally very low and the highest rate of infection was in February 30%(Table 1). The seasonal pattern was 5.1%, 3.9% and 1.0% during winter, summer and rainy season, respectively.

Moniezia expansa seems to be prevalent throughout the year. The seasonal prevalence during winter, summer and rainy season was 19.2%, 9.4% and 7.8%, respectively. *Moniezia benedeni* has a low frequency of occurrence 1.3%, 1.6% and 1.4% during winter, summer and rainy season, respectively. *Paramphistomum* spp. was detected occasionally and its seasonal prevalence did not exceed 1.6%.

Total egg counts of Strongyle/Trichostrongyle, *Strongyloides papillosus* and*Trichuris* spp. were 99, 11 and 414 epg (egg per gram of feces) during winter, summer and rainy season, respectively. This high output was mainly due to a rise in strongyle/trichostrongyle counts, which reached 239 epg in the rainy season. The pattern of egg output during various months is positively correlated with rainfall (Fig.1). With the onset of winter in November, the mean monthly egg count fell steadily to its lowest value of 7 epg in February. Such very low counts persisted until the beginning of the rainy season. The egg count for *S. papillosus* and *Trichuris* spp. was maintained at low levels throughout the different seasons.

Fecal culture of samples from sheep revealed the presence of the $L_3$of *Haemonchus contortus*, *Trichostrongylus* spp., *Cooperia* spp., *Oesophagostomum* spp. and *S.papillosus*. *H. contortus* larvae were the most common with a frequency of 75% from the positive samples. The frequency of *Trichostrongylus* spp., *Cooperia*spp., *Oesophagostomum* spp. and *S. papillosus* was 45%, 63%, 49% and 31.4%, respectively.

Examination of the Gastrointestinal Tract

Out of 45 gastrointestinal tracts examined 41 (91.1%) were found to harbor helminths. The rate of infection with nematodes, cestodes and trematodes was 82.2%, 57.8% and 8.9%, respectively. Seven species of nematodes were recorded. These were *H. contortus* from the abomasum, *Trichostrongylus colubriformis*, *Cooperia pectinata* and *S. papillosus* from the small intestine and *Oesophagostomum columbianum* and *Trichuris globulosa* from the large intestine. *Skrjabinema ovis* was recorded from both the small and large

intestine. The most prevalent species was *H. contortus* and the least was *S. ovis* (Table 2). Prevalence of nematodes during winter, summer and rainy season was 90%, 53.3% and 100%, respectively. Prevalence of individual species of nematodes reached its high levels of infection during the rainy season.

The seasonal prevalence for cestodes was 80%, 46.7% and 55% during winter, summer and rainy season, respectively. One or more species of cestodes were identified in 26 (57.8%) of the examined gastrointestinal tracts. The species involved were *Stilesia globipunctata*, *Avitellina centripunctata*, *Moniezia expansa* and *Moniezia benedeni*. *S. globipunctata* and *A. centripunctata* were the most common cestodes in sheep (Table 2).

Seasonal prevalence of trematodes was 10.0%, 13.3% and 5.0% during winter, summer and rainy season, respectively. Trematodes were identified in only 4 (8.9%) animals and they belong to the species *Paramphistomum cervi*.

Table 1: Prevalence (%) of gastrointestinal helminths in sheep from Central Kordofan as shown by coprological examination.

Month	Sheep examined	Positive animals	Prevalence (%) of parasites					
			Strongyle/trichostrongyle	*S. papillosus*	*Trichuris* spp.	*M . expansa*	*M. benedeni*	*Paramphistomum* spp.
Jan	29	18	51.7	10.3	0	13.8	0	0
Feb	10	6	40	0	30	30	0	0
Mar	30	9	16.7	10	6.7	6.7	0	0
Apr	30	11	16.7	16.7	0	10	3.3	0
May	67	27	28.4	1.5	4.5	10.4	1.5	3
Jun	NA	NA	NA	NA	NA	NA	NA	NA
Jul	80	21	22.5	6.3	1.3	1.3	1.3	0
Aug	51	41	76.5	19.6	0	7.8	2	2
Sep	70	67	94.3	75.7	1.4	7.1	1.4	1.4
Oct	92	83	90.2	44.6	1.1	14.1	1.1	0
Nov	10	9	90	20	1	0	0	0
Dec	29	25	69	31	0	27.6	3.4	0

NA= Samples not available

Table 2: Prevalence of gastrointestinal nematodes and cestodes of necropsied sheep originating from Central Kordofan (n= 45)

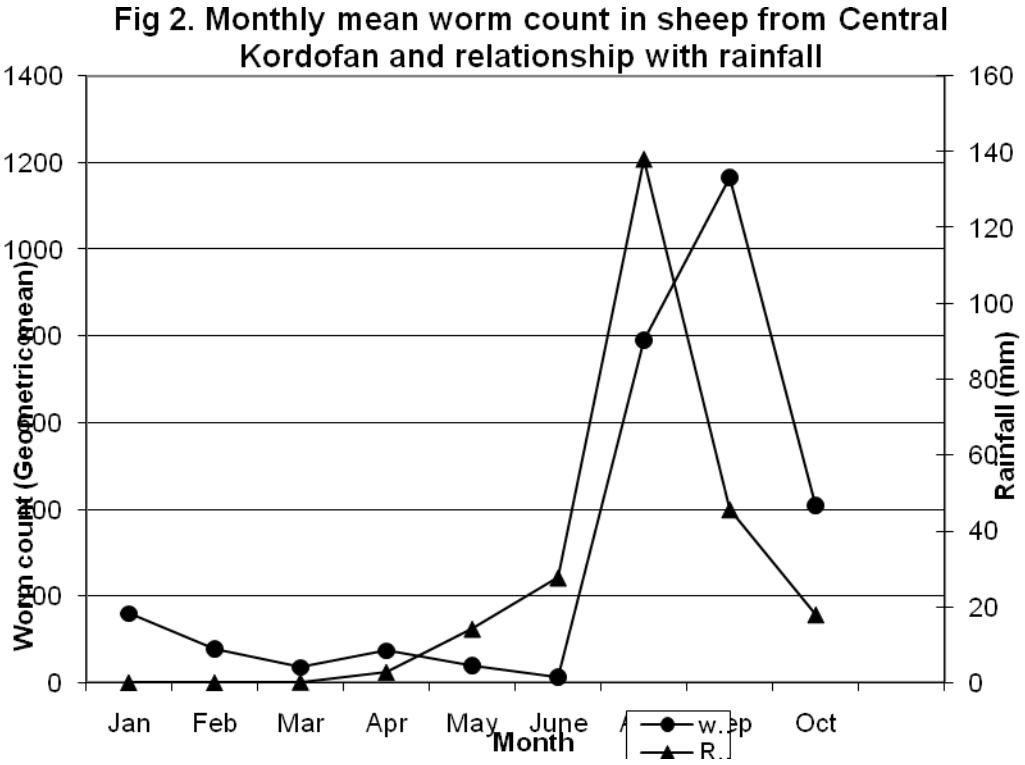
Species of parasites identified	Percentage of animals infected (%)
Haemonchu scontortus	68.9
Trichostrongylus colubriformis	60.0
Cooperia pectinata	35.1
Oesophagostomum columbianum	59.2
Strongyloides papillosus	62.2
Trichuris globulosa	27.0
Skrjabinema *ovis*	08.1
Stilesia globipunctata	37.8
Avitellina centripunctata	37.8
Moniezia expansa	11.1
Moniezia benedeni	02.2

Table 3: Mean (±Df) seasonal worm burden of sheep from Central Kordofan

Season	*H. contortus*	*T. colubriformis*	*C. pectinata*	*O. columbianum*	*S. papillosus*	*T. globulosa*	*S. ovis*
winter	43.0±9.7	48.0±12.8	4.0±5.8	5.0±4.9	13±9.2	1.0±1.6	1.0±1.0
Summer	3.0±8.3	4.0±13.2	1.0±3.3	2.0±4.8	6.0±12.0	1.0±1.7	0.0±0.0
Autumn	213±3.4	26.0±10.1	6.0±12.1	5.0±4.9	54±18.3	1.0±1.2	1.0±2.4

Df= Dispersion factor

Seasonal worm count was 185, 37 and 653 during winter, summer and rainy season, respectively. Monthly mean worm counts started to increase from 13 worms in July to 881 worms in August coinciding with increase in rainfall (Fig.2), reaching the peak in September and decreased thereafter as rainfall dropped. There was a clear seasonal influence on worm burden for most species (Table 3) with the highest burdens encountered in rainy season, relatively lowered in winter and reaching the lowest levels in summer.



Discussion

In the present study, the results indicated the presence of nematodes, cestodes as well as trematodes in sheep from Central Kordofan. The nematodes were the major groups of helminths parasitizing these animals. Of these *H. contortus* and *T. colubriformis* were found to be prevalent in more than 60% of infected sheep with moderate worm burdens. According toPradhan and Johnstone (1972); Barker (1973); Coop *et al*., (1976); Taylor and Pearson (1979) the pathological effects of these specific parasites on sheep include increased in permeability of blood vessels and leakage of proteins, reduction

in food intake and body weight gain, stunted bone growth, anemia, emaciation, weakness and high mortality and morbidity.

Both high fecal output and high worm counts were recorded during the rainy season. This could be attributed to the suitability of environmental conditions of moderate temperature (28-31°C) and moisture (37.5-70%) prevailing during this season providing optimum requirements for development of infective nematode larvae (see Pandey,1990; Onyali *et al*., 1990; Agyei, 1991; Rahman, 1992). Both egg and worm counts decreased at the end of the rainy season and this might be due to a self-cure phenomenon as these animals have been sensitized for several months during the rainy season (Altaif *et al*., 1980; Altaif and Issa, 1983; Chaudhry *et al*., 1988) and subsequently lost their worm burdens. This decrease continued throughout winter and summer and was probably induced by dryness (Okon and Enyenihi, 1977;Ogunsusi, 1979; Chiejina and Fakae, 1984; Chiejina*et al*., 1989;Connor *et al*., 1990).

It is not surprising to find infection with *Trichuris globulosa* to remain throughout the year, as the eggs of these species are known to remain viable for long periods of time (several years) and this increase the chance of acquisition of infection.

Cestodes were found to be less common than nematodes. The identified species were *S. globipunctata ,A. centripunctata*, *M. expansa* and *M. benedeni*. The high prevalence of *M. expansa* during winter might be attributed to the availability of oribatid mites in pasture. In Argentina, Denergi and Alzued (1992) reported that the increase in the number of oribatid mites coincided with the increase in mean temperature and rainfall. Here in Central Kordofan it may be inferred that oribatid mites occurred in high numbers in pasture during the rainy season. The mites ingest *Moniezia* eggs and the onchospheres take approximately four months to reach infective stage (Soulsby, 1986). Sheep ingest infected mites and the prepatent period is

37-40 days (Soulsby, 1986). So that the increase in frequency of *Moniezia* spp. would be expected to occur during winter.

Paramphistomum cervi had low frequency (8.9%) and appears to have no importance in sheep of Central Kordofan.

From this study we conclude that nematodes may be involved in causing significant losses in sheep production in this country. This is evidenced by the involvement of some of the potentially forms such as *H. contortus* and *T. colubriformis* and the high prevalence of these specific parasites. The fact that worm burdens were mostly moderate suggests presence of chronic infections, which may precipitate continuous loss in productivity.It is imperative, therefore, that effective programs be constructed to control this group of parasites.

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