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Some Epidemiological Aspects of Gastrointestinal Nematodes of Sheep

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ABSTRACT

Of 500 gastrointestinal tracts of sheep, 376 (75.2%) were positive for one or more nematode species of six different genera. *Haemonchus contortus* was the highest prevalent species followed by *Trichostrongylus colubriformis*, *Trichiuris ovis*, *Trichostrongylus axei*, *Oesophagostomum columbianum*, *Trichuris globulosa*, *Ostertagia circumcincta*, *Ostertagia trifurcata*, *Bunostomum trigonocephalum* and *Oesophagostomum venulosum*. The majority (75%; 282/376) of the infected sheep, harboured more than one species of nematode parasites, having minimum two and maximum six species in each host. The prevalence of different nematode species showed seasonal diversity and influenced by the age factor being the highest in younger and the lowest in older animals. Females prone to more infection than males.

Key Words: Prevalence; Nematodes; Age; Season; Sex; Sheep

INTRODUCTION

Gastrointestinal nematodes cause major drain on the production of sheep. Parasitic gastroenteritis has been incriminated worldwide for its adverse effects like reduction in appetite, loss of body weight, hypoproteinemia, impaired digestive efficiency and other pathogenic complications leading to lowered productivity, retarded growth rate and even death of lambs (Holmes, 1986; Sykes, 1994).

The prevalence of gastrointestinal parasites in sheep has also been reported very high (25.1 to 92%) by many workers in Pakistan (Khan, 1985; Iqbal *et al.*, 1993; Qayyum, 1996). However, it has been observed during the review of the literature that majority of these studies were based on the faecal examination and not the actual identification of nematodes which may have chances of misdiagnosis or omission. Moreover, only some of these studies report seasonal prevalence of the nematodes which limit their utility. This paper reports an explicit picture of the gastrointestinal nematode infections in sheep based on the taxonomy of the worms and also to know the seasonal trends of their prevalence in Faisalabad.

MATERIALS AND METHODS

Gastrointestinal tracts (n = 500) of sheep were collected at random from Faisalabad abattoir in one year being 8–12 per week. Age of sheep (Khan *et al.*, 1983) was noted before the animal was slaughtered. Ages of sheep were categorized into less than 1 year, 1–2 years and 3–4 years.

Sampling of nematodes was carried out within four hours after the collection of gastrointestinal tracts. Abomasum, small and large intestines were ligated at omasal–abomasal, abomasal–duodenal and ileo–caecal junctions to prevent worms spilling from one location to another. The worms were collected from abomasam, small and large intestines (Charles & Baker, 1988). The recovered nematodes were washed in physiological saline and fixed in 70% alcohol for 24 hours. The nematodes were transferred to a vial containing a hot mixture of 70% ethyl alcohol and glycerol (1:1). The worms were kept in this vial partly covered until all ethyl alcohol was evaporated. Cleared in lactophenol solution (Morgan & Hawkins, 1960) mounted in pure glycerol and identified (MAFF, 1979; Soulsby, 1982). A complete record of site of predilection seat and number of worms was also maintained. Measurements of the parasites were taken on a calibrated microscope.

RESULTS AND DISCUSSION

Three hundred and seventy six (75.2%) gastrointestinal tracts were found positive for one or the other nematode species belonging to six different genera. The recovered species included *Haemonchus (H.) contortus*, *Oesophagostomum (O.) columbianum*, *O. venulosum*, *Ostertagia (Os.) trifurcata*, *Os. circumcincta*, *Trichostrongylus (T.) axei*, *T. colubriformis*, *Trichuris (Tr.) ovis*, *Tr. globulosa* and *Bunostomum (B.) trigonocephalum*. *H. contortus* was the highest in prevalence (68%; 340/500) followed by *T. colubriformis* (42.2%; 211/500), *Trichiuris ovis* (36.4%; 182/500), *T. axei* (34.8%; 174/500), *O. columbianum* (22%; 110/500), *Tr. globulosa* (21.6%; 108/500), *Os. circumcincta* (18%; 90/500), *Os. trifurcata* (14.4%; 72/500), *B. Trigonocephalum* (13%; 65/500) and *O. venulosum* (7.4%; 37/500). A majority (75%; 282/376) of the infected sheep, harboured more than one species

of nematode parasites, having minimum two and maximum six species in each host. The maximum (54.3%) occurring combination was of *H. contortus, Os. circumcincta, B. Trigonocephalum, Tr. ovis, T. colubriformis* and *O. columbianum,* followed by *H. contortus, T. axei* and *Os. trifurcata* (19.1%); *H. contortus, Tr. ovis* and *O. venulosum* (11.2%); *T. axei, Tr. globulosa* and *O. venulosum* (9.6%); and *H. contortus* and *T. axei* (5.9%).

The nematode parasites recovered during this study have previously been reported (Siddiqi & Ashraf, 1980; Louw & Reinecke, 1991; Pandey *et al.*, 1994; Dorny *et al.*, 1995; Jacquiet *et al.*, 1995). In Pakistan, in addition to these species, *Chabertia ovina* from Peshawar (NWFP) (Siddiqi & Ashraf, 1980) and *Marshallagia marshalli* at Quetta (Balochistan) (Khan *et al.*, 1988) have also been reported. The above mentioned nematodes which are not recorded during this study could be due to the fact that different nematode species have different geographical distribution and required different climatic conditions for the development of their free–living stages.

The most prevalent nematode recovered in this study is *H. contortus.* This is in the agreement with findings of Bali and Singh (1977), Grant (1981) and Ahmed and Ansari (1987) who have observed that *H. contortus* was the most prevalent in small ruminants. The higher prevalence could be due to the fact that this nematode has a relatively short generation interval and its ability to take the advantage of favourable environmental conditions (Grant, 1981). According to Gordon's (1953) criteria mean monthly maximum temperature of 18°C or above and total monthly rainfalls of 50 mm are conducive for translation and transmission of *H. contortus.* Such conditions usually prevail in Faisalabad in the months of high incidence of *H. contortus.* Low infection of *H. contortus* was recorded especially during winter season (Decmber, January and February). This seems contrary to the work of Grant (1981) and Ahmed and Ansari (1987). It could be due to the low temperature that retards the development of free–living stages and even at 9°C no development takes place (Soulsby, 1982). The prevalence of Oesophagostomum spp., is in agreement with Ahmed and Ansari (1987). Moderate infection of *Oesophagostomum* spp. may be due to the fact that warm, moist summer in Faisalabad, is well suited to the development and survival of the free–living stages of this parasite (Grant, 1981). The incidence of *Oesophagostomum* spp., however, is not in conformity with the results of Gupta *et al.* (1988), Khan *et al.* (1988) and Misra and Ruprah (1988). They reported that relatively low prevalence of these species in winter months could be because of the low resistance of the free–living stages of this parasite to quick varying weather conditions (Kates, 1950).

The highest and lowest prevalence of *H. contortus, T. colubriformis, Tr. ovis, T. axei, Os. circumcincta, Tr. globulosa, O. columbianum, Os. trifurcata, B. Trigonocephalum* and *O. venulosum* was in the months of July (92.9%) and January (26.7%); December (65.2%) and June (26.2%) ; July (76.2%) and February (5.0%); December (50.0%) and March (21.4%) ; August (50.0%) and February (7.5%); August (36.8%) and May (12.0%); November (31.0%) and May (14.0%); September (25.0%) and April (5.0%); September (17.5%) and April (7.5%); and August (13.2%) and February (2.5%), respectively. The results show that *Trichostrongylus* species are recorded throughout the study period with relatively higher prevalence during winter months (November–February). Trichostongylus species are generally cool–season parasites (Southcott *et al.*, 1976) and thrive best at low temperature. The highest prevalence of Ostertagia spp. was recorded either in September or in November. The high incidence of Ostertagia species could be attributed to the fact that the larvae of this nematode are abundant on the pasture after rainy season and higher humidity. Moderate prevalence of Trichuris species is in close agreement with the findings of Cabaret (1983). However, its prevalence is related to soil moisture (Smith & Archibald, 1965) and temperature (6–20°C). These conditions are satisfied during the rainy and winter seasons in Faisalabad. The intensity of the infection of *B. Trigonocephalum* in the slaughtered animals is low and does not show any seasonal trend. This could be due to the susceptibility of the free–living stages of this parasite to weather conditions (Shorb, 1940) resulting in their shorter survival time on the pasture under most of the climatic conditions. The highest and lowest prevalence of *H. contortus, T. colubriformis, Tr. ovis, T. axei, Os. circumcincta, Tr. globulosa, O. columbianum, Os. trifurcata, B. Trigonocephalum* and *O. venulosum* was in the sheep having age < 1 and > 2 years (70.2%; 37.3%); > 2 and < 1 years (54.9%: 24.%); < 1 and > 2 years (48.9%: 15.7%); > 1–2 and > 2 years (43.8%: 27.5%); > 1–2 and < 1 year (21%: 15.4%); < 1 and > 2 years (26.6%: 5.9%); > 2 and > 1–2 years (30.3%: 15.2%); > 2 and < 1 year (15.7%: 13.8%); < 1 and > 2 years (14.5%: 7.8%); > 2 and > 1–2 years (8.8%: 5.7%), respectively. It was observed that sheep having less than one year of age were heavily infected (worm burden) as compared to sheep having 1–2 years and more than three years of age. The data on sex–wise prevalence revealed highest and lowest rate of infection of *H. contortus, T. colubriformis, Tr. ovis , T.*

axei, Os. circumcincta, Tr. globulosa, O. columbianum, Os. trifurcata, B. Trigonocephalum and *O. venulosum* in females (88.7%) and males (52.8%); females (53.3%) and males (34%); females (39.2%) and males (34.4%); females (44.3%) and males (27.8%); females (18.4%) and males (17.7%); females (26.4%) and males (18.1%); females (27.4%) and males (18.1%); females (16%) and males (13.2%); males (13.2%) and females (12.7%); and females (9%) and males (6.3%), respectively. It was found that ewes harboured higher worm burdens and higher prevalence as compared to males. An overall higher prevalence of gastrointestinal nematodes in sheep of < one year and > 1–2 years of age as compared with in those > 2 years is attributed to the development of resistance in older animals after repeated exposure. Likewise, higher prevalence of nematode parasites in females compared with males may be because of lowered resistance of female animals due to their reproductive events and insufficient/unbalanced diet against higher needs.

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