Prevalence of Gastrointestinal Helminthes among Goats in and around Ranchi, Jharkhand, India

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Abstract

In this present study, a total of 930 goats with symptoms of gastrointestinal infection were examined for the presence of gastrointestinal helminths of which 801 (86.13%) were found to be positive. The different gastrointestinal helminths those were observed are Fasciola spp. and Paramphistomum spp. in trematodes; only Moniezia expansa and Moniezia benedeni in cestodes and among nematodes, Strongyloides spp., Trichostrongylus spp., Haemonchus spp., Trichuris spp., Oesophagostomum spp., Bunostomum spp., Ostertagia spp., Cooperia spp. and Marshallegia sp. Highly significant (P<0.01) relationships were recorded between season, age and sex wise variations with helminth prevalence. The present study provides the epidemiological pattern and risk factors associated with gastrointestinal helminth infection in goats in and around Ranchi, Jharkhand.

Keywords

Gastro-intestinal helminths, Ranchi, Prevalence, Goats, Small ruminants, Helminth epidemiology

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Introduction

In rural areas of our country, goat farming is one of the most important sources of livelihood of the farmers (Jithendran, 2000 and Bandyopadhyay et al., 2010). India ranks second in goat production with a population of 135.17 million goats and Jharkhand accounts to 6.58 million of goats (http://www.dahd.nic.in/documents/statistics/livestockcensus).

Reduction in productivity (body weight, milk and meat), increased mortality and morbidity leads heavy economic losses in goat production (Jithendran, 2000). This problem has been neglected time and again due to its chronic and insidious nature (Sanyal, 1998), although the losses are in millions of rupees (Shan and Chaudhry, 1995). It has always been a major impediment in small ruminant production and this problem is severe in
tropical and sub-tropical climates due to favorable ecological factors available for transmission of helminth parasites (Gupta et al., 2013). Epidemiological pattern of gastrointestinal helminth parasites would shed some light for evolving strategic tactical control of these parasites (Jithendran, 2000). There is none to very little study in this sector in goats of Jharkhand. So, this study of prevalence of gastrointestinal helminths in goats in and around Ranchi has been designed to provide us with a clearer understanding of its epidemiological status.

Materials and Methods

No ethical committee approval was needed as this present study was conducted on fecal sample basis and fecal samples were collected from freshly void or directly from the animals’ with prior permission of their owners.

Ranchi covers a geographical area of 175.12 Km² with dense tropical forest and hilly topography. It’s located in southern part of Chota Nagpur plateau nearer to Tropic of Cancer and lies at 23˚22’N 85˚20’. Ranchi has an average elevation of 651m above sea level. An annual rainfall of 1430mm is recorded at Ranchi with minimum and maximum ambient temperatures ranging from, 0 to 25˚C in winter and 20 to 42˚C in summer, respectively (https://www.weather-forecast.com/locations/Ranchi).

The present study was conducted from November, 2011 to October, 2013. Animals showing gastrointestinal symptoms were taken in this study for fecal sample examination. The helminth ova were detected by Modified Sheather’s Sugar floatation technique and Formal ether acetic acid technique was used for detecting eggs of trematodes (Sloss et al., 1984 and Zajac and Conboy, 2011). Fecal culture was conducted by modified Baermann’s technique to identify the infective larval stages of helminths (Sloss et al., 1984 and Zajac and Conboy, 2011).

Results and Discussion

Out of 930 samples collected and examined from goats in and around Ranchi, 801 were recorded to be positive for gastrointestinal helminths (Table 1 and Figure 1). Thus, the Overall prevalence was found to be 86.13%. The different GI helminths those were observed are Fasciola spp. and Paramphistomum spp. in trematodes; only Moniezia expansa and Moniezia benedeni in cestodes and among nematodes, Strongyloides spp., Trichostrongylus spp., Haemonchus spp., Trichuris spp., Oesophagostomum spp., Bunostomum spp., Ostertagia spp., Cooperia spp. and Marshallagia sp. were recorded. The factors that could affect the prevalence are managerial practices, anthelmintics used, grazing habitat, economic strata of the farmer, farmer’s educational background, climatic conditions, age and sex of the animals examined (Shan and Chaudhry, 1995; Sanyal, 1998 and Ahmed et al., 2017). This higher prevalence of gastrointestinal helminths is in accordance with other workers in India (Velusamy et al., 2015; Molla and Bandyopadhyay, 2016; Sanalkumar, 2017 and Jena et al., 2018) and abroad (Raza et al., 2014; Yeasmin et al., 2015, Ahmed et al., 2017 and Dabasa et al., 2017), in different climatic conditions. Nematodes were recorded to be of highest prevalence (62.37%) followed by trematodes (56.02%) and cestodes (47.63%) (Table 1 and Figure 1). Similar findings were reported by Gupta et al., in 2013; Poddar et al., Islam et al., Ahmed et al., Sanalkumar et al., and Sohail et al., in 2017 and in 2018 by Jena et al., The higher prevalence of gastrointestinal parasites in tropical, subtropical and also temperate climates could be attributed to their wide range of adaptability (Soulsby, 1966; Sanyal, 1998 and Poddar et al., 2017).
Table 1: Prevalence of gastrointestinal helminthes of goats in and around Ranchi

<table>
<thead>
<tr>
<th>Group</th>
<th>Overall G.I. helminths</th>
<th>Trematodes</th>
<th>Cestodes</th>
<th>Nematodes</th>
<th>X²</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>P</td>
<td>PR%</td>
<td>P</td>
<td>PR%</td>
</tr>
<tr>
<td></td>
<td>930</td>
<td>801</td>
<td>86.13</td>
<td>521</td>
<td>56.02</td>
</tr>
<tr>
<td>Season</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rainy</td>
<td>310</td>
<td>294</td>
<td>94.84</td>
<td>235</td>
<td>75.81</td>
</tr>
<tr>
<td>Winter</td>
<td>310</td>
<td>269</td>
<td>86.77</td>
<td>169</td>
<td>54.52</td>
</tr>
<tr>
<td>Summer</td>
<td>310</td>
<td>238</td>
<td>76.77</td>
<td>117</td>
<td>37.74</td>
</tr>
<tr>
<td></td>
<td>X²</td>
<td>42.50**</td>
<td>91.58**</td>
<td>112.18**</td>
<td>153.83**</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-3 month</td>
<td>241</td>
<td>229</td>
<td>95.02</td>
<td>171</td>
<td>70.95</td>
</tr>
<tr>
<td>4 to 9 month</td>
<td>355</td>
<td>319</td>
<td>89.86</td>
<td>241</td>
<td>67.89</td>
</tr>
<tr>
<td>&gt;9 month</td>
<td>334</td>
<td>253</td>
<td>75.75</td>
<td>109</td>
<td>32.63</td>
</tr>
<tr>
<td></td>
<td>X²</td>
<td>50.21**</td>
<td>116.25**</td>
<td>71.10**</td>
<td>140.03**</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>281</td>
<td>222</td>
<td>79.00</td>
<td>111</td>
<td>39.50</td>
</tr>
<tr>
<td>Female</td>
<td>649</td>
<td>579</td>
<td>89.21</td>
<td>410</td>
<td>63.17</td>
</tr>
<tr>
<td></td>
<td>X²</td>
<td>17.11**</td>
<td>44.60**</td>
<td>29.29**</td>
<td>57.06**</td>
</tr>
</tbody>
</table>

N - Total no. of goat examined; P - Total no. of goat positive; PR% - Prevalence rate (%); X² - Chi Square value; ** - Highly significant relationship

Fig.1 Overall Prevalence of GI helminths in goats in and around Ranchi
Fig. 2 Seasonal Prevalence (%) of GI helminths in goats in and around Ranchi

Fig. 3 Age wise prevalence (%) of GI helminths in goats in and around Ranchi

AGE WISE PREVALENCE

Overall Prevalence
Trematode
Cestode
Nematode
Rainy season was recorded to have highest overall prevalence of 94.84% followed by 86.77% in winter and the lowest being recorded at 76.77% in the summer months (P<0.01) (Table 1 and Figure 2). The relationship between season and infection was found to be highly significant (P<0.01). Among all the GI helminths viz. trematodes, cestodes and nematodes, it was observed that higher prevalence was being recorded in Rainy season at 75.81%, 71.94%, and 84.19% respectively. In winter nematodes were recorded to have highest prevalence (66.45%) followed by trematodes (54.52%) and cestodes (38.39%). Summer was found to be with least prevalence rate, viz. trematodes, cestodes and nematodes at 37.74%, 32.58% and 36.45%, respectively (Table 1 and Figure 2). Similar findings were also recorded by Gaherwal et al., (2016), Sanalkumar et al., (2017) and Jena et al., (2018). In rainy season, the higher prevalence of gastrointestinal helminths can be accredited to a number of favorable climatic conditions such as high relative humidity, rainfall, soil salinity, ambient temperature. These climatic conditions help in adequate growth and development of the infective larval stages in rainy season. It’s also well documented that larval availability and pasture contamination is directly related to helminth infection (Soulsby, 1966 and Sanyal, 1998). Comparatively lower infection rate in winter can be a result of arrested development of larval stages due to cold stimuli and stall feeding practices in the winters as reported by Hutchinson and coworkers in 1972.

Age wise prevalence showed strong statistical evidence (P<0.01) of relationship between different age groups and gastrointestinal helminths infection. Younger animals (0 to 3 months at 95.02%) showed higher infection rate in comparison to adults’ viz. 4 to 9 months at 89.86% and more than 9 months at 75.75% (Table 1 and Figure 3). Molla and Bandyopadhyay (2016), Poddar et al., (2017) and Jena et al., (2018) found similarly higher
and lower rate of prevalence among younger age groups and adult animals, respectively. 0-3 months age group was also recorded to have highest prevalence (79.67%) of nematode infection. The lowest infection was recorded in >9 month age group of cestodes (29.34%) (Table 1 and Figure 3). The reason for kids (0-3 month age group) harboring significantly higher infection may be since previous infections and age of the animals provide protection against recurrent infections as a result younger animals most commonly suffer from acute infections, as opined by Soulsby in 1966.

Females (89.21%) were recorded with higher prevalence rate in comparison to males (79%) and the relationship was highly significant (P<0.01) (Table 1 and Figure 4). Similarly higher prevalence among trematodes, cestodes and nematodes was recorded in females’ viz. 63.17%, 53.47% and 70.26% whereas lower prevalence was recorded in males viz. 39.50%, 34.16% and 44.13%, respectively (Table 1 and Figure 4). This was evident among all the GI helminths as shown in Table 1. Similar findings were also reported by Islam et al., at Mymensingh, Bangladesh in 2017, Dabasa et al., at Bale zone of south eastern Ethiopia in 2017, Rizwan et al., (2017) at Sialkot district of Punjab, Pakistan and recently by Jena and co-workers in 2018 in and around Ranchi. Other workers like, Asif et al., (2007) and Raza et al., (2014) reported inconsistent results in prevalence of gastrointestinal parasite infection. The females might be more susceptible gastrointestinal infections due to high stress and low immunity status in female animals during lactational period, post parturient period and also when the animal is pregnant (Islam et al., 2017; Dabasa et al., 2017; Jena et al., 2018).

This present study observed very high prevalence of gastrointestinal helminths infection in goats of Ranchi and its surrounding locality. This epidemiological study can be used in formulation of a strategic gastrointestinal helminth management.

**Acknowledgment**

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