

Original Article

## Prevalence of gastrointestinal parasite in small ruminants of District Dir Upper Khyber Pakhtunkhwa Province of Pakistan

Prevalência de parasita gastrointestinal em pequenos ruminantes do distrito Upper Dir, da província de Khyber Pakhtunkhwa, no Paquistão

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### Abstract

The present research was planned to assess the occurrence of intestinal parasites in small ruminants of Upper Dir of Khyber Pakhtunkhwa Province of Pakistan. For this purpose, the faecal material was collected randomly with gloved fingers directly from the rectum region of sheep and goats and the faecal materials were then put in hygienic plastic bottles with 10% formalin. The overall 315 (n=184 sheep and n= 131 goats) faecal samples were collected out of 315 samples, 281 were found positive for different parasites. Patterns-wise prevalence of GI parasites of the study area was found. Overall Single parasitism 89.20% (281/315) with 94.0% (173/184) in sheep and 82.43% (108/131) in goats. Double parasitic infection in small ruminant recorded in which *Fasciola*+ *Haemonchus. contortus* in sheep were found their prevalence was 25.54% (47/184). While in goats, the double parasitic infection in which *Haemonchus contortus*+*Trichuris* spp were found and their prevalence were 23.43% (30/131). The species found in the sample of sheep were includes, i.e., *Strongyloides papillosus* (41.30%), *Haemonchus contortus* (21.73%), *Trichuris ovis* (17.39%), and *Fasciola hepatica* (13.58%), the corresponding value for goat were *Strongyloides spp* 33.33% (36/108), *Haemonchus spp* 28.70%, (27/108), *Trichuris spp* 25.20% (27/184) and *Fasciola spp* 10.68% (14/184). The sheep of the study area are more infected as compared to goats. This study suggested that gastrointestinal parasites are major health problems of small ruminants in the study area. Therefore, a comprehensive study on species of gastrointestinal parasites circulating in the area, control options, cost-effective strategies and awareness about gastrointestinal parasites among the farmers in the study area should be instituted.

**Keywords:** *Fasciola* spp., *Haemonchus* spp., prevalence, *Strongyloides*.

### Resumo

A presente pesquisa foi planejada para avaliar a ocorrência de parasitas intestinais em pequenos ruminantes do distrito Upper Dir, da província de Khyber Pakhtunkhwa, no Paquistão. Para tanto, o material fecal foi coletado aleatoriamente com dedos enluvados diretamente da região do reto de ovelhas e cabras, e os materiais fecais foram colocados em garrafas plásticas higiênicas com formol a 10%. No total, 315 (n = 184 ovelhas e n = 131 cabras) amostras fecais foram coletadas; destas, 281 foram consideradas positivas para diferentes parasitas. A prevalência de padrões de parasitas GI da área de estudo foi encontrada. Parasitismo global único 89,20% (281/315) com 94,0% (173/184) em ovinos e 82,43% (108/131) em cabras. Infecção parasitária dupla em pequenos ruminantes registrada em *Fasciola* + *Haemonchus contortus* em ovinos, sua prevalência foi de 25,54% (47/184). Já em caprinos, a dupla infecção parasitária em que *Haemonchus contortus* + *Trichuris* spp foram encontrados e sua prevalência foi de 23,43% (30/131). As espécies encontradas na amostra de ovinos foram: *Strongyloides papillosus* (41,30%), *Haemonchus contortus* (21,73%), *Trichuris ovis* (17,39%) e *Fasciola hepatica* (13,58%), o valor correspondente para cabra foi *Strongyloides spp.* 33,33% (36/108), *Haemonchus spp.* 28,70%, (27/108), *Trichuris sp* 25,20% (27/184) e *Fasciola spp.* 10,68% (14/184). As ovelhas da área de estudo estão mais infectadas do que as cabras. Este estudo sugeriu que os parasitas gastrointestinais são os principais problemas de saúde dos pequenos ruminantes na área de estudo. Portanto, um estudo abrangente sobre as espécies de parasitas gastrointestinais que circulam na área, opções de controle, estratégias de baixo custo e conscientização sobre parasitas gastrointestinais entre os agricultores na área de estudo deve ser instituído.

**Palavras-chave:** *Fasciola* spp., *Haemonchus* spp., prevalência, *Strongyloides*.

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## 1. Introduction

Gastrointestinal parasites cause mortalities, production loss, and weight loss in small ruminants (goats and sheep), thereby impeding their production system. Small ruminants (goat and sheep) constitute a significant portion of livestock in a country (Siddiki et al., 2009). Livestock has greater importance in raising the financial position of a country because livestock is the chief source of protein, and their products like skin, bones, and many goods are made from the fetch of these animals (Gupta et al., 1987). Common abdominal parasites of livestock are *coccidia* species of phylum protozoa. Trematodes belong to flukes, nematodes commonly called roundworms, cestodes famous on tapeworms, while the most abundant nematodes in small ruminants are *Tricho Strongyloides* which their prevalence are worldwide (Awraris et al., 2012). Nematodes have a single host life cycle in small or large ruminant's guts to complete their life cycle (Scott and Sutherland, 2009). Nematode's infections are very significant economically that are the leading agents for poor growth and insufficient production. Livestock are highly susceptible to different infections of these nematodes (Lashari and Tasawar, 2011), Paramphistomiasis, Fascioliasis, Tricho strongylosis, Haemonchosis and oesophagostomiasis GI parasitism can affect the growth and production of livestock (Speedy, 1992). Haemonchosis cause serious mortalities in sheep and goats also cause significant loses if there is no treatment programmes and appropriate monitoring of parasites (Besier et al., 2016). Trematodes are endoparasites that have indirect life cycles with one or more intermediate host's molluscs (Berra and Au, 1978). Parasites of trematodes are universally distributed in ruminants' animals and have attained a high zoological position in the world (Rafique et al., 2009). The common fluke's *Fasciola hepatica* lives in the liver of sheep and causes *fascioliasis*. *Fasciola hepatica* intends countless financial harm that are universally discrete classes (Irfanullah et al., 2016).

Mature trematodes parasitic infection in animals that are the basis to infection in sheep and goats remain dependent on the geographic diversity of chosen class everywhere. Scientific suggestions about trematodes infection clinical symptoms, which are typically happening in hot regions of the biosphere, contain weakness, weight loss, reduce milk manufacture, water-logged, decreasing quality, watery diarrhoea, decrease in the number of products, and even death caused by parasites (Gupta et al., 1987).

No evidence is accessible of parasites of goats and sheep in the present region. This evidence with suggestion is primarily essential for the identification and prevalence of parasitic disease that provides significant understanding for investigation and prevalence of helminthiasis in Dir upper. Therefore, this current research was aimed at examining and the occurrence of the different parasites found in the Gastrointestinal tract of both goat and sheep of Dir upper District of KPK.

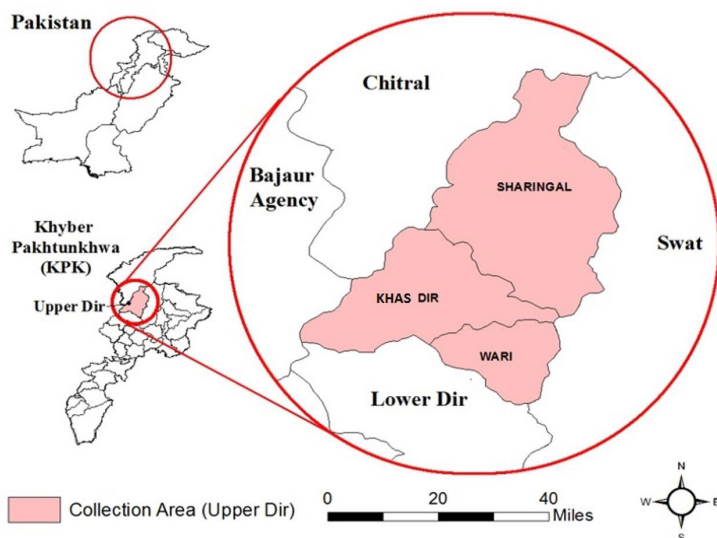
## 2. Methods and Materials

### 2.1. Study area

The total area of District Upper Dir is 3699 square kilometers. It is situated with latitudes and longitudes of 35° and 71° N, respectively. Geographically upper Dir district is situated on the north side of Pakistan. This district is surrounded in North West by district Chitral, west by Bajwar agency, in the south by district Dir lower, while in the East by Swat district see (Figure 1) Mostly district Dir upper is covered with high mountains and hills. In contrast, there is no plain area in the study region.

### 2.2. Study population

The study population consisted of all goats and sheep in the study area.



**Figure 1.** Map of Study area Dir Upper KPK Pakistan.

### 2.3. Samples collection

Faecal samples were collected from upper Dir districts of the three most populated regions as Wari, Khas Dir, and Sharingal.

### 2.4. Direct smear methods (wet mount techniques)

#### 2.4.1. Normal saline solution

A solution of the saline wet mount was made in which 2 grams of faeces were mixed within the drop of saline upon a glass slide. A light microscope was used for smear examination as described by Urquhart et al. (1987).

#### 2.5. Sedimentation technique

The sedimentation technique was used to detect some parasites' eggs like trematodes eggs are larger than other parasitic eggs; therefore, these eggs settled down quickly in the test tube when centrifuged with a solution of NaCl. After this, a drop of settled down material put on the slides with a drop of NaCl and examined under the microscope at 4x and 10x ranges, respectively.

### 2.6. Statistical analysis

Statistically, analysis conducted using SPSS 16.0. The comparative occurrence of dissimilar gastrointestinal (GI) parasites class or individuals correspondingly measured as (%) of prevalence = (numbers of +samples/Total numbers of samples studied) x100. The evocative information gotten examined over manifold log deteriorations for the measurement of

significance of association determined like age of species sex and ecology of occurrence and gastrointestinal parasites in small ruminants (Sajid et al., 2009).

## 3. Results

The current study is based on the identification and prevalence of gastrointestinal parasites in small ruminants (goats and sheep) in District Upper Dir. It has not been reported previously by any other author of the mentioned area. Overall, in this present study, 312 (n=184 sheep and n= 131 goats) were collected in Upper Dir Pakistan (Table 1).

The overall prevalence of helminth parasites was reported 89.20% (281/315) with 94% (173/184) in sheep and 82.43% (108/131) in goats with the occurrence percentage of *Strongyloides papillosus* 41.30% (76/184), *Haemonchus contortus* 21.73% (40/184), *Trichuris ovis* 17.39% (32/184) and *Fasciola hepatica* 13.58% (25/184) in sheep while the prevalence of *Strongyloides Papillosus* 33.33% (36/131), *Haemonchus contortus* 28.70% (27/131), *Trichuris ovis* 25.20% (27/131) and *Fasciola hepatica* 10.68% (14/131) in goats were found (Table 1).

Patterns wise prevalence of GI parasites of the study area were found in single parasitism 89.20% (281/315) with 94.0% (173/184) in sheep and 82.43% (108/131) in goats with the occurrence of *Strongyloides spp* 41.3% (76/184), *Haemonchus spp* 24.77% (40/184), *Trichuris spp* 17.39% (32/184) and *Fasciola spp* 13.58% (25/184) in sheep while the prevalence of *Strongyloides spp* 27.48% (36/131), *Haemonchus spp* 23.39% (33/131), *Trichuris spp* 21.37% (28/131) and *Fasciola spp* 8.39% (11/131) in goats were found (Table 2)

**Table 1.** Prevalence of helminth parasite in sheep and goats grazing in hilly areas of District Dir Upper Pakistan.

Parasites	Sheep (n=184)		Goats (n=131)		Overall (%)
	No of Samples positive	Infection (%)	No.of samples Positive	Infection (%)	
<i>Strongyloides papillosus</i>	76	41.30	36	33.33	112/315 (35.55)
<i>Haemonchus contortus</i>	40	21.73	31	28.70	71/315 (22.53)
<i>Trichuris ovis</i>	32	17.39	27	25.20	57/315 (18.09)
<i>Fasciola hepatica</i>	25	13.58	14	10.68	39/315 (12.38)
<b>Total</b>	<b>173</b>	<b>94.0</b>	<b>108</b>	<b>82.43</b>	<b>281/315 (89.20)</b>

**Table 2.** Pattern wise Single parasitic infection among sheep and goats in District Dir upper.

Parasites	Sheep (n=184)		Goats (n=131)		Overall (%)
	No of +eve Samples	Infection (%)	Positive Samples	Infection (%)	
<i>Strongyloides spp</i>	76	41.30	36	27.48	112/315 (35.55)
<i>Haemonchus spp</i>	40	21.73	33	25.19	71/315 (22.53)
<i>Trichuris spp</i>	32	17.39	28	21.37	57/315 (18.09)
<i>Fasciola spp</i>	25	13.58	11	8.39	39/315 (12.38)
<b>Total Parasites</b>	<b>173</b>	<b>94.0</b>	<b>108</b>	<b>82.43</b>	<b>281/315 (89.20)</b>

Double parasitic infection in small ruminant of District Upper Dir recorded in two categories in sheep and goats first category for sheep in which *Fasciola+ Haemonchus. contortus* were included, their prevalence were 25.54% (47/184), and the second category in which *trichuris. Ovis+ Haemonchus. Contortus* were included, their prevalence recorded 22.82% (42/184), while in Goats, the triple parasitic infection of the first category in which *Haemonchus contortus+Trichuris spp* were included and their prevalence were 23.43% (30/131) and the second category in which *Haemonchus. contortus +stryngile* were recorded, their prevalence was 18.75% (24/131) see (Table 3)

Triple parasitic infection in sheep of District Upper Dir recorded in two categories in sheep and goats first category for sheep in which *Fasciola spp+ H. contortus + T. ovis* were included their prevalence was 20.10% (37/184). In the second category in which *Trichuris spp + Haemonchus spp+Strongyle* were included, their prevalence recorded 25.54% (47/184). In contrast, in Goats, the triple parasitic infection of the first category in which *H. Contortus + Trichuris spp, Strongyle spp* were included and their prevalence were 26.56% (34/184) and the second category in which *Haemonchus spp+Strongyle spp+Fasciola spp* were recorded, their prevalence was 17.96% (23/131) see (Table 4)

#### 4. Discussion

This present research work showed the overall occurrence of the parasite in sheep and goat that were 94.0% (n=173/184 and 89.20% (n=108/131), respectively.

Different species of nematodes recovered during this investigation have already been reported by different researchers in different parts of the world (Pedreira et al., 2006; Nwosu et al., 2007; Lashari and Tasawar, 2011).

The prevalence recorded in the present study is lower than the study conducted by (Gadahi et al., 2009). They reported overall prevalence among the sample from the sheep n=48(53.33%) and n=206(66.45%) from goat were detected positive for GI parasites. Thus the result of the present study is nearly similar to the study conducted by (Singh et al., 2017). They reported the prevalence rate of goat 212 (85.16%) while in sheep 391 (79.24%), the occurrence of gastrointestinal parasites tended to be higher in sheep 62 (72%) than in goats 160(63%) (Asif et al., 2008).

In risk factor Patterns wise prevalence of GI parasites of the study area was found in overall single parasitism 89.20% (281/315) with 94.0% (173/184) in sheep and 82.43% (108/131) in goat with the occurrence of *Strongyloides* 41.3% (76/173), *Haemonchus spp* 24.77% (40/173), *Trichuris spp* 17.39% (32/173) and *Fasciola spp* 13.58% (25/173) in sheep while the prevalence of *Strongyloides spp* 27.48% (36/108), *Haemonchus spp* 23.39% (33/108), *Trichuris spp* 21.37% (28/108) and *Fasciola spp* 8.39% (11/108) in goat were found see (Table 2).

Similarly, a study conducted in various part of the world revealed that the result of the present study is nearly similar to the study conducted by (Gadahi et al., 2009). In their investigation, 53.33% prevalence for sheep and 66.45% prevalence for goat have observed in which most of the sample were positive with multiple infections than single

**Table 3.** Double parasitic infection among sheep and goat in District Dir upper Pakistan.

Parasites	Sheep (N=184)		Parasites	Goats (N=131)	
	Positive Samples (N)	Infection (%)		Positive Samples (N)	Infected Samples (%)
<i>Fasciola+Haemonchus. Contortus</i>	47/184	25.54	<i>Haemonchus. Contortus+Trichuris ovis</i>	30/131	23.43
<i>Trichuris. Ovis+ Haemonchus. Contortus</i>	42/184	22.82	<i>Haemonchus.Contortus +stryngelides</i>	24/131	18.75
<b>Total</b>	<b>89/184</b>	<b>48.36</b>	<b>Total</b>	<b>54/131</b>	<b>42.18</b>

**Table 4.** Triple parasitic infection among sheep and goats in District Dir upper.

Parasites	Sheep (n=184)		Parasites	Goats (n=131)	
	Positive Samples (n)	No. Infected (%)		Positive Samples (n)	No. Infected (%)
<i>Fasciola spp+ Haemonchus spp +Trichurus spp</i>	37/184	20.10	<i>Haemonchus + Trichuris+Strongyle</i>	34/131	26.56
<i>Trichuris spp + Haemonchus spp+Strongyle spp</i>	47/184	25.54	<i>Haemonchus+stryngile+ Fasciola</i>	23/131	17.96
<b>Total</b>	<b>84/184</b>	<b>45.64</b>	<b>Total</b>	<b>57/131</b>	<b>44.52</b>

infection 38 (42.22%) and 156 (50.32) in sheep and goats respectively also study conducted by (Raza et al., 2014) reported their prevalence with significant P value = 0.01 in single infections of parasites.

In the current study, the double parasitic infection rate in goats and sheep was 48.36% (89/184) and 42.18% (54/131) in goats of District Upper Dir KPK Pakistan, with nematodes and protozoa 25.54% (47/184), and Nematodes 22.82% (42/184) in sheep and nematodes-nematodes 23.43% (30/148), and 42.18% (54/131) see (Table 3) in goats respectively.

The present study result of double parasitic infection was nearly similar to the study instigated by Ayaz et al. (2013) in small ruminants and greater than the study conducted by (Rafiullah et al., 2011). Their investigation reported higher double parasitic infection with a significant P value=0.02. This infection rate is due to the variation present in weather grazing behaviour, and many other risk factors responsible for the prevalence of parasitism in small ruminants discussed earlier.

In the current study, triple parasitic infection in sheep of District Upper Dir were nematodes and protozoan with the prevalence rate of 25.54% (47/184) of species *Fasciola spp*+ *H. contortus* + *T. ovis*. And *H. Contortus* + *Trichuris* +*Strongyle* 26.56% (34/184) and *Hemunchus spp*+*Strongyle spp* +*Faciola spp* = 17.96% (23/131) see (Table 4) in goats. These triple parasitic infections were also investigated by various researchers in various parts of the world, like 42.225 by (Gadahi et al., 2009), who reported the prevalence of parasitic infections in small ruminants of the species *Trichurus spp*+*Coccidia spp* and *Haemonchus spp*.

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