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Research Paper

Impacts of Haemonchosis on Small Ruminants in South Punjab, Pakistan

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This study was designed to determine dynamic dispersal, treatment of *H. contortus* and its effect on blood profile of small ruminants in district Lodhran, Punjab, Pakistan. Out of total 646 animals, 30.03% (97/323) sheep and 25.07% (81/323) goats were found positive. The prevalence was found having positive ($P<0.05$) association with seasons and body condition score. A total of 60 infected animals (n= 30 for each sheep and goats) were divided into five groups A, B, C, D and E (n=6 for each group) for the analysis of efficacy trials and blood profile. They were treated with the combination of triclabendazole and levamisole (A), *Mallotus philippensis* (B) and *Fumaria indica* (C) whereas groups D and E were maintained as control positive (infected untreated) and control negative (uninfected untreated) respectively. Triclabendazole and levamisole combination was the most effective treatment in order followed by kamila (*Mallotus philippensis*) and shahtrah (*Fumaria indica*). The statistical analysis of blood profile showed significant ($P<0.05$) decrease in red blood cells's, haemoglobin, pack cell volume, total serum protein concentration, serum albumin and significant ($P<0.05$) increase in eosinophil number and serum enzymes level in infected animals. In conclusion, *H. contortus* may be considered as endemic in study area.

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INTRODUCTION

Gastro-intestinal nematodes are common in small ruminants of developing countries like Pakistan (Strain and Stear, 2001 and Saddiqi *et al*., 2010). Among them, *Haemonchus contortus (H. contortus)* is a voracious blood sucking nematode and responsible for huge economic losses (Raza *et al*., 2007; Saddiqi *et al*., 2010) through anemia, diarrhea, weight loss and death of animals (Ejlertsen *et al*., 2006; Squires *et al*., 2011; Nabi *et al*., 2014). Each worm of *H. contortus* sucks about 0.05 mL of blood per day from stomach (Raza *et al*., 2009; Tasawar *et al*., 2010; Qamar and Maqbool, 2012). It has also effects on digestive efficiency which can lead to loss of meat (27%) and wool (40%) in sheep and goats (Iqbal and Jabbar, 2005; Bachaya *et al*., 2006; Mushtaq *et al*., 2011). The prevalence range of *H. contortus* is in between 24.6% to 80.64% in Pakistan (Al-Shaibani *et al*., 2008 and Asif *et al*., 2008). It causes hematological and biochemical disturbances and produced adverse effects in sheep and goats by drop off the normal values especially in erythrocytes, lymphocytes, hemoglobin, packed cell volume (Asif *et al*., 2008 and Ijaz *et al*., 2009) and enzymatic assays like change in the levels of aspartate aminotransferase (AST) or serum glutamate oxalate transaminase (SGOT) and alanine aminotransferase (ALT) or serum glutamate pyruvate transaminase (SGPT) (Hassan *et al*., 2013). Clinical signs and fecal examinations are two major tools for the diagnosis of haemonchosis. Eggs are found in feces when there is infection of *H. contortus* is present. The treatment of haemonchosis is based upon anthelmintic drugs throughout the world (Quintin *et al*., 2004). But the use of these chemicals produced resistance in the body of worms (Mortensen *et al*., 2003 and Kaplan, 2004). So, herbal medicine may be considered as one of the effective treatment along with anthelmintic. The base of ethno-veterinary medicine is on traditional knowledge, methods, practices and skills to maintain health or to cure diseases of animals (Deeba *et al*., 2009). The anthelmintic activity of various plants has been studied by different researchers (Githiori *et al*., 2004; Marie-Magdeleine *et al*., 2010; Kamaraj *et al*., 2011). To this end no study has been conducted regarding haemonchosis in the study area therefore, the present study was designed to check the prevalence, intensity, treatment and effect of haemonchosis on blood profile of sheep and goats in district Lodhran, Punjab, Pakistan.

MATERIALS and METHODS

Geo-location of study area: Lodhran is located on the northern side of river Satluj. Lodhran is situated at 71.63° East longitude and 29.54° North latitude and is 112 meters elevation above the sea level. The climate of the district is dry and hot in summer and cold in winter. The minimum and maximum temperature ranges between 28°C to 42°C in summer. The temperature varies between 5°C and 21°C during winter. The average annual rainfall in the district is 71mm.

Collection and analysis of fecal sample: Prevalence study was conducted from April-2013 to March-2014 in sheep and goats reared by small holder livestock farmers in Lodhran. Different animal farms were visited on weekly and monthly basis during which 646 small ruminants (n=323 sheep and n=323 goats) were randomly selected and sampled. About 5 grams of fecal sample was collected directly from the rectum of each sheep and goat after wearing disposable glove. The samples were stored in 10% formalin, labeled and dispatched to Medicine Laboratory University of Veterinary and Animal Sciences, Lahore. The fecal samples were examined through direct smear method while EPG was performed using Modified McMaster

Technique. The identification of *H. contortus* egg was made on the basis of key described by Soulsby (2005).

Chemotherapy: A total of 60 animals (n=30 sheep and n=30 goats) were randomly selected out of which 48 animals (n=24 sheep and n=24 goats) were naturally infected with *H. contortus* and 12 healthy animals (n=6 sheep and n=6 goats) negative for *H. contortus*. Animals were randomly divided into four groups of 6 viz. A, B, C, D and E. The animals in group A was treated with triclabendazole plus levamisole (Trimax®, Prix Pharmaceutica (pvt) Ltd) at 12 mg +7.5 mg/kg orally while the members in group B was given kameela (*Mallotus philippensis*) at 24mg/kg orally. The sheep and goats in group C were given shahtra (*Fumaria indica*) at 35 mg/kg orally. The members in group D served as control positive and the members in group E served as control negative. Fecal samples were collected at day 0 (pre-medication) and then at day 3, 7, 14, and 21 (post-medication) for egg per gram (EPG). Egg per gram was counted by McMaster Technique as detailed by Soulsby (2005). The efficacy of the drugs was calculated on the basis of reduction in EPG measured as per formula (Varady *et al*., 2004).

Blood profile: For this purpose 10 mL blood sample was collected from each member of groups A, B, C, D and E at day 0 (before treatment) and day 21(after treatment). After collection blood was stored into test tubes having anticoagulant and without anticoagulant for haematological and biochemical analysis. It was used to determine the effect of *H. contortus* on hemoglobin, leukocyte count, differential leukocyte count, erythrocyte count, packed cell volume, mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), mean corpuscular hemoglobin concentration(MCHC), platelets count, total serum proteins, albumin, AST and ALT by using haematological and biochemistry analyzers at University Diagnostic Laboratory.

Statistical analysis: The resulted data of prevalence was analyzed by frequency analysis using chi-square test. The percentages and 95% confidence limit for some parameters were determined and where appropriate odd ratio was also computed. Data on chemotherapy and hemogram was analyzed by one way Analysis of Variance (ANOVA) using Statistical Package for Social Sciences (SPSS) version 17.0. A probability level ≤ 0.05 was considered as statistically significantly different.

RESULTS

Dynamic dispersal: In this study overall prevalence of *H. contortus* was 30.03% and 25.07% in sheep and goats, respectively. Sex wise prevalence was calculated as 23.00%, 33.80%, 21.11% and 22.32% in male and female sheep and goats, respectively as shown in Table 1. The occurrence of *H. contortus* in Cholistani, Thali and Buchi breeds of sheep was examined 32.72%, 26.73% and 30.36%, respectively, whereas the prevalence of *H. contortus* in Nachi, Beetal and Teddy goat breeds 23.91%, 25.60% and 25.47% respectively. The infection of *H. contortus* in stall feeding, grazing and stall plus grazing systems of feeding was examined as 25.40%, 32.77%, 27.50% and 20.00%, 27.69% and 21.92% in sheep and goats, respectively. In current study the seasonal wise prevalence was recorded in summer, spring, autumn and winter seasons as 51.82%, 24.21%, 18.86%, 10.77% and 43.20%, 18.75%, 10.00%, 8.06% respectively in sheep and goats as shown in Table 1. The season-wise prevalence of *H. contortus* was significantly different ($P<0.05$) between various seasons of year in sheep and goats.

Table 1: Prevalence and egg per gram count of *H. contortus* in sheep and goats in Lodhran

Species/ Sex/ Age/Breed	No. of Animal	Positive		95% CI	Odd Ratio/ reciprocal	MH Chi-Sq P-value
		n	%			
Sheep	323	97	30.03	25.22-35.20	1.28/0.78	-
Goats	323	81	25.07	20.58-30.02		
Sheep: Sex						
Male	110	25	23.00	15.62-31.25	0.58/1.74	-
Female	213	72	33.80	27.69-40.36		
Breed						
Cholistani	110	36	32.72	24.45-41.90	-	P = 0.352
Thali	101	27	26.73	18.79-35.99		
Buchi	112	34	30.36	22.38-39.34		
Feeding system						
Stall Feeding	63	16	25.40	15.82-37.19	-	P = 0.435
Grazing	180	59	32.77	26.22-39.89		
Stall+Grazing	80	22	27.50	18.57-38.03		
Seasons						
Summer	110	57	51.82	42.49-61.05	-	P = 0.000
Spring	95	23	24.21	16.40-33.57		
Autumn	53	10	18.86	10.00-31.06		
Winter	65	7	10.77	4.83-20.14		
Goats: Sex						
Male	90	19	21.11	13.61-30.44	0.93/1.07	-
Female	233	52	22.32	17.32-28.00		
Breeds						
Nachi	92	22	23.91	16.03-33.41	-	P = 0.404
Beetal	125	32	25.60	18.53-33.79		
Teddy	106	27	25.47	17.87-34.40		
Feeding System						
Stall Feeding	55	11	20.00	10.99-32.10	-	P = 0.460
Grazing	195	54	27.69	21.75-34.29		
Stall+Grazing	73	16	21.92	13.55-32.48		
Season						
Summer	125	54	43.20	34.72 -51.99	-	P = 0.000
Spring	96	18	18.75	11.87-27.49		
Autumn	40	4	10.00	3.26-22.38		
Winter	62	5	8.06	3.01-16.97		

Summer (May-Aug); Spring (Feb-April); Autumn (Sep-Oct); Winter (Nov-Jan)

Intensity of Haemonchus contortus: Data on EPG values of sheep in different groups at various days is given in Table 2. At day 0 (pre-treatment) and day 3 (post treatment), EPG values of group A, B, C and D were non-significantly different (P>0.05). However, at day 7 (post treatment), EPG values of groups A, B and C were significantly reduced (P<0.05) compared to group D. Similarly, at day 14 and 21, a decreasing trend in EPG values in groups A, B and C were observed while the EPG values in group D were significantly increased (P<0.05) at day 21 compared to day 0. When compared the EPG values of group A, B and C at day 21, the difference was non-significant (P>0.05).

Data on EPG values of goats in different groups at various days is given in Table 2. At day 0 (pre-treatment) and day 3 (post treatment), EPG values of group A, B, C and D were non-significantly different (P>0.05). However, at day 7 (post treatment), EPG values of groups A, B and C were significantly reduced (P<0.05) compared to group D. Similarly, at day 14 and 21, a decreasing trend in EPG values in groups A, B and C were observed while the EPG values in group D were significantly

Table 2: EPG values of *H. contortus* at various days and in sheep and goats

Drugs	Animal spp.	EPG values at various days after treatment				
		0day	3rd day	7th day	14th day	21st day
(A)Triclabendazole+ Levamisole,	Sheep	1867±176.38^{a}	1433±130.81^{a}	817±65.41^{a}	633±61.46^{a}	167±61.46^{a}
	Goat	1717±60.09^{a}	1333±33.33^{a}	967±55.78^{a}	650±42.817^{a}	233±55.78^{a}
(B) Mallotus philippensis	Sheep	1800±73.03^{ab}	1533±80.28^{ab}	1117±87.24^{b}	750±76.38^{ab}	367±55.78^{ab}
	Goat	1783±47.72^{ab}	1500±51.63^{ab}	1200±63.24^{ab}	800±63.24^{ab}	417±47.72^{ab}
(C) Fumaria indica	Sheep	1750±76.38^{abc}	1500±73.03^{abc}	1200±57.74^{c}	917±47.73^{c}	533±55.78^{bc}
	Goat	1733±55.78^{abc}	1567±61.46^{bc}	1300±73.02^{bc}	983±47.73^{bc}	600±51.64^{bc}
(D) Positive control	Sheep	1733±88.19^{abcd}	1783.±70.32^{bcd}	1833±80.28^{d}	1917±79.23^{d}	2017±70.32^{d}
	Goat	1767±71.49^{abcd}	1783±70.32d	1817±70.31^{d}	1883±70.32^{d}	1983±70.32^{d}
(E) Negative control	Sheep	0.00±0.00^{e}	0.00±0.00^{e}	0.00±0.00^{e}	0.00±0.00^{e}	0.00±0.00^{ae}
	Goat	0.00±0.00^{e}	0.00±0.00e	0.00±0.00^{e}	0.00±0.00^{e}	0.00±0.00^{e}

Values in same column having different superscript letters are statistically significantly (P<0.05) different

increased (P<0.05) at day 21 compared to day 0. When compared the EPG values of group A, B and C at day 21, the difference was non-significant (P>0.05).

Efficacy of drugs against Haemonchus contortus: Data on efficacy of different drugs used in both sheep and goats is shown in Table 2. Results of the study demonstrated that combination of triclabendazole and levamisole was found the most effective treatment of *H. contortus,* in order followed by kamila (*Mallotus philippensis*) shahtrah (*Fumaria indica*) in both sheep and goats.

Hematological values of sheep and goats: Hematological parameters in different groups of sheep and goats are given in Table 4 and 5. At day 0, no significant difference (P>0.05) was observed in hematological values of sheep and goats in groups A, B, C and D compared to E. At day 21 hematological values were significantly different (P<0.05) in sheep and goats of groups A, B and C compared to D, whereas hematological values in group D was non-significantly different (P>0.05) at day 0 and 21. At day 21 RBC's count, hemoglobin, PCV, MCV, MCH, MCHC, Platelets and Lymphocyte count was significantly increased (P<0.05) in sheep and goats of groups A, B and C compared to group D whereas WBC count, Monocyte count and Granulocytes count were significantly decreased (P<0.05) in sheep and goats of groups A, B and C compared to group D.

Serum biochemical values of sheep and goats: The serum biochemical values in different groups of sheep and goats are given in Table 6 & 7. At day 0, no significant difference (P>0.05) was observed in serum biochemical profile in any animal of groups A, B, C and D as compared to group E. At day 21 serum biochemical values were significantly increased (P<0.05) in sheep and goats of groups A, B and C compared to group D, whereas group D was found non-significantly different (P>0.05) at day 0 and 21. At day 21 albumin and total serum protein were significantly increased (P<0.05) in sheep and goats of groups A, B and C compared to D whereas alanine aminotransferase (ALT), aspartate aminotransferase (AST) was significantly reduced (P<0.05) in sheep and goats of groups A, B and C compared to D.

DISCUSSION

Dynamic dispersal: H. contortus is of high economic significance due to its high prevalence and blood sucking habit (Aumont *et al*., 1997 and Notter *et al*., 2003) especially under warm and wet conditions. The findings of our study are congruent with the results reported by Muzarab *et al*., (1980), Maqsood *et al*. (1996), Tariq *et al*. (2003) and

Table 3: Hematological values in different groups at day 0 and 21 in Sheep (Mean±SD)

Groups	Days	WBCs($\times10^9$/l)	RBCs($\times10^{12}$/l)	Hb (g/dl)	PCV (%)	MCV (fl)	MCH (pg)	MCHC (g/dl)	PLT1 ($\times10^9$/l)	LYMPH (%)	MONO (%)	GRANUL (%)
A (n=6)	0	*41.05±10.21	*7.53±1.01	*6.98±1.34	*20.58±2.60	*24.16±2.22	*6.56±0.52	*23.61±2.65	*183.00±69.45	*78.23±8.31	*6.43±1.98	*70.66±8.47
	21	*7.83±1.50	*11.94±1.84	*12.73±1.48	*42.5±9.28	*33.55±3.12	*10.00±0.97	*32.30±0.88	*544.00±149.04	*55.95±9.82	*3.70±0.86	*33.08±6.60
B (n=6)	0	*39.43±10.38	*6.50±1.142	*6.08±0.67	*19.75±1.58	*22.33±1.15	*5.58±1.01	*21.98±1.43	*192.50±70.51	*79.33±10.34	*4.11±1.18	*72.16±9.17
	21	*8.65±1.88	*12.11±1.44	*11.83±1.89	*40.83±7.86	*33.68±2.95	*10.68±0.97	*32.58±0.52	*558.67±64.05	*55.13±9.11	*3.01±1.27	*28.56±9.60
C (n=6)	0	*37.60±8.96	*5.19±.86	*5.16±0.68	*18.91±2.54	*21.56±0.85	*4.91±0.67	*18.45±1.45	*165.33±45.74	*80.16±5.58	*4.38±1.01	*72.00±10.39
	21	*6.98±1.38	*11.95±1.72	*11.83±1.54	*50.57±11.17	*34.08±3.42	*9.93±0.79	*32.36±1.12	*556.50±101.08	*51.26±4.53	*2.51±0.52	*29.40±7.84
D (n=6)	0	**41.26±13.57	**5.06±0.75	**5.01±0.85	**14.53±2.51	**18.76±1.88	**4.78±0.78	**19.96±2.35	**152.83±27.13	**65.95±11.64	**2.26±0.77	**70.01±8.03
	21	**44.26±8.14	**4.65±0.56	**4.73±0.48	**13.01±1.97	**17.26±1.41	**4.61±0.57	**19.63±2.79	**145.50±24.77	**66.78±12.86	**2.26±0.77	**77.18±8.89
E (n=6)	0	**8.05±1.54	**12.65±1.57	**12.96±1.22	**49.53±11.55	**33.63±2.01	**10.18±1.1	**32.61±0.79	**437.83±153.62	**59.28±8.51	**4.01±1.32	**35.90±8.18
	21	**8.05±1.54	**12.65±1.57	**12.96±1.22	**49.53±11.55	**33.63±2.01	**10.18±1.1	**32.61±0.79	**437.83±153.62	**59.28±8.51	**4.01±1.32	**39.21±5.27

Values having different superscripts letters in each column are statistically significantly different (P<0.05)*indicates that values are statistically significantly different (P<0.05)**indicate that values are statistically non significantly different (P>0.05)

Table 4: Hematological values in different groups at day 0 and 21 in Goats (Mean±SD)

Groups	Days	WBCs($\times10^9$/l)	RBCs($\times10^{12}$/l)	Hb (g/dl)	PCV (%)	MCV (fl)	MCH (pg)	MCHC(g/dl)	PLT1 ($\times10^9$/l)	LYMPH (%)	MONO (%)	GRANUL (%)
A(n=6)	0	*34.45±8.17	*6.34±0.99	*6.40±0.35	*23.16±1.16	*20.46±1.82	*5.00±0.43	27.38±2.00	*247.00±26.43	*35.00±3.02	*5.00±0.44	*70.66±8.47
	21	*9.13±0.86	*13.40±1.54	*11.68±1.16	*33.83±4.07	*33.08±3.04	*10.15±1.03	32.21±1.00	*403.33±37.10	*50.03±1.00	*3.16±0.42	*30.08±6.00
B(n=6)	0	*35.28±6.03	*6.10±1.10	*6.13±0.21	*23.33±1.21	*19.00±1.49	*5.00±0.43	27.00 ±3.00	*230.00±26.39	*34.00±4.15	*4.38±1.00	*72.16±9.17
	21	*10.21±0.94	*13.40±0.90	*11.85±1.39	*37.00±6.16	*34.16±4.07	*10.28±1.37	32.26±1.01	*383.33±19.91	*51.00 ±8.00	*3.00±1.01	*28.00±9.30
C (n=6)	0	*27.50±5.74	*5.01±0.81	*6.15±0.18	*23.33±1.21	*26.00±1.21	*5.00±0.24	29.00 ±2.00	*223.50±22.81	*34.40±4.00	*4.11±1.00	*72.00±10.39
	21	*9.86±1.13	*13.53±0.55	*11.35±1.58	*38.16±5.63	*38.16±5.00	*10.23±1.03	32.28±1.00	*394.16±28.35	*59.00 ±7.00	**2.00±1.08	*26.40±6.84
D(n=6)	0	**37.00±6.69	**5.30±0.75	**6.10±0.12	**23.00±0.89	**27.00±1.19	**5.00±0.14	37.00 ±4.00	**212.16±21.70	**37.00 ±4.00	**2.00±1.08	**70.01±8.03
	21	**43.50±7.23	**5.06±0.74	**5.73±0.25	**20.33±1.50	**28.00±1.19	**5.00±0.14	37.00 ±4.00	**202.16±21.70	**37.00 ±4.00	**4.00±1.00	**77.18±8.89
E(n=6)	0	**8.33±0.60	**11.48±1.56	**9.43±0.58	**38.66±7.96	**33.00 ±2.14	**6.04±0.35	32.13±1.00	**442.50±30.31	**49.33±6.43	**4.00±1.00	**36.90±8.19
	21	**8.33±0.60	**11.48±1.56	**9.43±0.58	**38.66±7.96	33.00±2.14	**6.04±0.35	32.13±1.00	**442.50±30.31	**49.33±6.43	3.70±0.62	**36.90±8.19

n= No. of animals; Values having different superscripts letters in each column are statistically significantly different (P<0.05)*indicates that values are statistically significantly different (P<0.05); **indicate that values are statistically non significantlydifferent (P>0.05)

Table 5: Serum biochemistry values in different groups at day 0 and 21 in Sheep (Mean±SD)

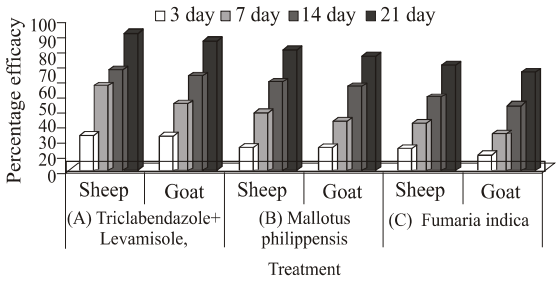
Group	Days	Total serum protein (g/dl)	Albumin (g/dl)	ALT (u/l)	AST (u/l)
A (n=6)	0	*2.85±0.76	*1.83±0.28	*55.33±5.68	*137.00±8.60
	21	*6.83±0.38	*3.05±0.24	*28.66±5.68	*96.83±18.91
B (n=6)	0	*2.78±0.64	*1.78±0.27	*56.66±7.60	*152.16±8.23
	21	*6.98±0.49	*3.13±0.39	*32.66±5.53	*85.50±11.32
C (n=6)	0	*2.95±0.73	*1.88±0.14	*58.33±6.97	*151.83±13.01
	21	*6.00±0.24	*2.65±0.25	*37.83±5.30	*108.83±10.22
D (n=6)	0	**2.55±0.52	**1.36±0.41	**61.33±7.76	**157.83±19.81
	21	**2.61±0.62	**1.48±0.47	**64.33±11.32	**172.66±25.37
E (n=6)	0	**6.86±0.54	**3.40±0.14	**29.50±5.92	**82.66±20.37
	21	**6.86±0.54	**3.40±0.14	**29.50±5.92	**2.66±20.37

Values having different superscripts letters in each column are statistically significantly different (P<0.05) *indicates that values are statistically significantly different (P<0.05) **indicate that values are statistically non significantly different (P>0.05)

Table 7: Serum biochemistry values in different groups at day 0 and 21 in Goats (Mean±SD)

Group	Days	Total serum protein (g/dl)	Albumin (g/dl)	ALT (u/l)	AST (u/l)
A (n=6)	0	*3.35±0.62	*1.96±0.24	*70.83±6.76	*248.83±6.30
	21	*6.93±0.33	*3.11±0.25	*34.16±6.43	*137.66±34.58
B (n=6)	0	*2.75±0.45	*1.61±0.34	*62.16±6.30	*255.16±10.77
	21	*7.00±0.34	*3.56±0.57	*36.50±7.68	*194.83±11.33
C (n=6)	0	*3.65±0.81	*1.46±0.37	*71.83±6.73	*151.83±13.01
	21	*6.56±0.38	*3.63±0.78	*37.83±5.30	*209.00±9.87
D (n=6)	0	**2.55±0.52	**2.01±0.48	**72.00±9.01	**267.66±11.48
	21	**2.46±0.64	**1.35±0.47	**65.00±10.27	**172.66±25.37
E (n=6)	0	**6.81±0.26	**3.45±0.36	**41.83±9.02	**156.16±17.22
	21	**6.81±0.26	**3.45±0.36	**41.83±9.02	**156.16±17.22

n= No. of animals; Values having different superscripts letters in each column are statistically significantly different (P<0.05) *indicates that values are statistically significantly different (P<0.05); **indicate that values are statistically non significantly different (P>0.05)



Tariq *et al*. (2008) were 36.8%, 47.1%, 38% and 59.6% in small ruminants, respectively. These minor differences in the range of prevalence may be due to environmental and managerial conditions. Nearly, similar trend of sex wise prevalence of *H. contortus* was recorded in males (84.6%) as compared to females (72.1%) in sheep. These significantly differences were due to lack of resistance of animals to *H. contortus* infection and environmental factors may contribute to this (Tasawar *et al*., 2010). Similarly the higher prevalence was illustrious in summer, followed by autumn, spring and winter by Nginyi *et al*., (2001) in Kenya, Shahadat *et al*., (2003) in Bangladesh, Khajuria and Kapoor, (2003) in India and Lateef *et al*., (2005) in Pakistan. There are several aspects that contribute the disease commencement like humid, warm and wet grazing season, the more time animals used on pasture, poor husbandry practices, ineffective choice of de-wormers or and the increased anthelmintic resistance against *H. contortus*.

Efficacy of drugs against Haemonchus contortus: Similarly, a trend of many chemicals and many herbal plants against worm control was observed by different researchers. Chemicals are mostly used for the treatment and control of gastrointestinal parasites throughout the world (Ancheta *et al*., 2004; Quintin *et al*., 2004; Ghisi *et al*., 2007). *Mallotus philippinensis* usually known as kamila in traditional medicine system. The plant of several properties kamila are in folk medicine system that are includes as anthelmintic and it has also effects against tape worm infections, parasitic skin infections, eye problems (Sharma and Varma, 2011 and Ahmed and Siddiqa, 2013). *Fumaria indica* frequently known as Shahtrah, it has many medicinal properties in folk medicine as an anthelmintic, diuretic, laxative and stomachic activities and it is also used for purification of blood in traditional medicine system (Gupta *et al*., 2012).

Hematological values: In hematological values of sheep and goats significant changes were observed in WBC's, RBC's, hemoglobin, PCV, platelets and granulocytes. In granulocytes eosinophils values were very disturbed. After treatment the alteration in these hematological values were decreased. Likewise, major effects of parasite on indigenous animals are severe anemia along with hematological disturbances (Iqbal *et al*., 1998).After treatment with different drugs the quality of blood loss by the parasites was minimized as reported by Yacob *et al*. (2008). The value of circulating eosinophil count was higher in infected animals. The relationship of reduced packed cell volume and eosinophilia was observed with each other (Woolaston *et al*., 1996).

Serum biochemical values of sheep and goats: Parasitism in indigenous animals causing biochemical and hematological disturbances may lead to the anemia (Rasool *et al*., 1995; Iqbal *et al*., 1998).The value of circulating eosinophils count was higher in infected animals. The relationship of reduced packed cell volume and eosinophilia was observed with each other (Woolaston *et al*., 1996). In present study the values of total serum protein and albumin in sheep and goats were examined. At day 0 total serum protein values and albumin were very changed and at day 21 total serum protein and albumin were in normal. The values of alanine

aminotransferase (ALT) and aspartate aminotransferase (AST) at day 0 were observed in altered way. At day 21 alanine aminotransferase (ALT) and aspartate aminotransferase (AST) were in normal pattern.

H. contortus has serious effect on serum biochemistry and enzymatic assays like alkaline phosphate (ALP), aspartate aminotransferase (AST) and alanine aminotransferase (ALT). It has been reported higher significantly in small ruminants (Hassan *et al*., 2013). There is a change in total serum protein (TSP) level, synthesis of proteins in liver was found to be increased and was suggested to be due to the loss of plasma protein into the intestine as a result of increased mucosal permeability caused by *H. contortus* and many more parasites (Bahrami *et al*., 2011). Based on these results, it may be concluded that small ruminants of the selected study area are under the high risk of the *H. contortus*, which may be minimized by controlling the various associated determinants and applying the suitable treatment in combination.

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