



Short Communication

Point Prevalence of Gastrointestinal Helminths and their Association with Sex and Age of Buffaloes in Lower Punjab, Pakistan

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Abstract

A cross sectional survey was conducted to determine the prevalence of gastrointestinal helminths (GIH) and their association with sex and age of the buffaloes in lower Punjab, Pakistan. To this end, a total of 800 fecal samples of buffaloes were examined following standard parasitological procedures. Coprocultures were carried out to identify the species of the helminths. Nematodes, trematodes and cestodes contributed 50, 31.25 and 18.15%, respectively in the overall prevalence (59.38%) of GIH. In sex- and age-wise analysis of collected data, prevalence was found higher ($P < 0.05$) in males (65.71%) and young stock (75.5%) as compared to females (54.44%) and adults (41.25%). The species of helminths recorded in this study included *Toxocara vitulorum*, *Charbertia* spp., *Strongyloides papillosus*, *Trichuris globulosa*, *Oesophagostomum radiatum*, *Gongylonema verrucosum*, *Trichuris discolor*, *Teladorsagia ostertagi*, *Fasciola gigantica*, *Gastrothylax crumenifer*, *Paramphistomum explanatum*, *Cotylophoron cotylophorum*, *Avitellina centripunctata*, *Strongyloides papillosus* and *Gongylonema verrucosum*. In conclusion, sex and age are two major factors which influence the rate of prevalence of GIH in buffaloes. Results of this study may help the animal health care planners to devise appropriate control strategies against GIH. © 2014 Friends Science Publishers

Keywords: Buffaloes; Sex; Age; Gastrointestinal helminths; Prevalence; Pakistan

Introduction

Parasitism is one of the major problems of profitable livestock production throughout the World (Farooq et al., 2012; Lamy et al., 2012). Economic losses due to decreased production and effects of parasites on host vary depending upon type of host and parasite species involved (Khan et al., 2013; Masood et al., 2013; Abbas et al., 2014). Helminths are responsible for causing haematological and biochemical disturbances, impaired digestive efficiency (Simpson, 2000), loss of carcass (27%) and sometimes, mild to moderate mortality (Kanyari et al., 2009).

Like other parts of world, helminthiasis has also been reported from different parts of Punjab-Pakistan (Ayaz et al., 2013; Goraya et al., 2013). As far as could be ascertained, no report is available on helminth infection in buffaloes in the current study area (District of Jhang). Keeping in view, high number of livestock heads (Anonymous, 2012), and riverine location of the study area, a cross sectional survey was conducted to determine the prevalence of gastrointestinal helminthes (GIH) in buffalo population of District of Jhang in Lower Punjab of Pakistan.

Materials and Methods

Study Area

Jhang lies between 30°-37 to 31°-59 north latitudes and 71°-37 to 73°-13 east longitudes of Punjab, Pakistan. Total area of district is 8.809 km². It is situated in the north of Sargodha and Hafizabad; on south by Khanewal; on west by Layyah, Bhakkar and Khushab; and on the east by Faisalabad and Toba Tek Singh districts. The annual rainfall is about 288 mm. The district has extremes of climate. May, June and July are the hottest months. The mean minimum and maximum temperature in these months ranges from 28 to 40°C, respectively. December, January and February are the coldest months with a temperature range from 6 to 27°C. Jhang is mainly a canal irrigated plain agricultural area with sugarcane, wheat and rice being its main crops. The total buffalo population in the study area was 1.175 million (Anonymous, 2012).

Sampling

Buffaloes (n=800) were selected randomly from three union councils of District Jhang, Pakistan to determine the prevalence of GIH from 2009 to 2012, periodically, during May to June. All the animals under study had not been

dewormed for the last six months before sampling. Fecal samples were collected directly from the rectum of buffaloes and brought to the Parasitology Laboratory, Department of Pathobiology, College of Veterinary and Animal Sciences, Jhang, Pakistan for examination.

Parasitological Procedures

The samples were examined for helminths eggs/larvae using modified sedimentation and floatation techniques as described by Iqbal et al. (2006). Copro-culturing technique was performed to obtain the larvae for species identification of nematodes (Zajac and Conboy, 2006).

Statistical Analyses

Data thus obtained were analyzed by applying odds ratio and multiple logistic regression analysis through PASW Statistics 18 (SPSS Inc., SPSS, Chicago, Illinois).

Results

In the present study, a high prevalence rate (59.38%) of helminthiasis was recorded in the buffalo population of lower Punjab, Pakistan. Sex- and age-wise analysis of

results revealed a significantly higher ($P=0.060$) rate of prevalence in males (65.71%) as compared to females (54.44%) and in ($P=0.002$) calves (75.5%) as compared to adults (41.25%). Distribution of different classes of helminths included ($P=0.040$) nematodes (50%) followed by trematodes (31.25%) and cestodes (18.75%) (Table 1).

The species of helminthes recorded in the order of prevalence were: *Oesophagostomum radiatum*, *Toxocara vitulorum*, *Moniezia benedeni*, *Charbertia* species, *Paramphistomum explanatum*, *Avitellina centripunctata*, *Trichuris discolor*, and *Gongylonema verrucosum*. Mixed infection of GIH with different magnitude was also observed in the males (15%), females (13.76%), young (25%) and adult (10%) buffaloes. From the individual GIH combination ($P=0.006$), *Toxocara vitulorum*, *Avitellina centripunctata* and *Moniezia expansa* were dominant species in calves and *Teladorsagia ostertagi*, *Moniezia benedeni* and *Paramphistomum cervi* in adults. Sex associated difference was found to be non-significant ($P=0.006$).

Discussion

To the best of our knowledge, this is first report on the GIH of buffalo population of the study area.

Table 1: Sex and age-wise prevalence of gastrointestinal helminths in buffaloes of district Jhang (lower Punjab Pakistan)

Gastrointestinal Species/Genera Identified	Buffalo(n=800)						Overall prevalence of gastrointestinal helminths (%)
	Male (n=350)		Odds Ratio (P Value)	Female (n=450)		Odds Ratio (P Value)	
	Young (n=175)	Adult (n=175)		Young (n=225)	Adult (n=225)		
<i>Gastrothylax crumenifer</i>	16.00% (28)	8.00% (14)	1.13 (0.001)	15.56% (35)	4.44% (10)	1.12 (0.002)	10.875
<i>Oesophagostomum radiatum</i>	22.86% (40)	14.29% (25)	1.05 (0.012)	12.00% (27)	5.33% (12)	1.10 (0.001)	13
<i>Toxocara vitulorum</i>	41.14% (72)	15.43% (27)	1.08 (0.031)	12.00% (27)	7.11% (16)	1.28 (0.027)	17.75
<i>Moniezia benedeni</i>	41.71% (73)	8.00% (14)	1.52 (0.016)	15.56% (35)	5.78% (13)	1.31 (0.011)	16.875
<i>Chabertia species</i>	36.00% (63)	13.14% (23)	1.09 (0.043)	16.89% (38)	3.11% (07)	1.32 (0.014)	16.375
<i>Paramphistomum cervi</i>	21.71% (38)	10.86% (19)	1.59 (0.003)	14.67% (33)	5.78% (13)	1.09 (0.016)	12.875
<i>Paramphistomum explanatum</i>	30.29% (53)	16.57% (29)	1.81 (0.007)	12.00% (27)	4.44% (10)	1.11 (0.004)	14.875
<i>Fasciola gigantica</i>	10.29% (18)	6.29% (11)	2.00 (0.022)	11.56% (26)	2.67% (06)	0.61 (0.004)	7.625
<i>Teladorsagia ostertagi</i>	12.00% (21)	5.71% (10)	1.56 (0.009)	15.56% (35)	8.89% (20)	0.81 (0.034)	10.75
<i>Cotylophoron cotylophorum</i>	14.29% (25)	6.86% (12)	1.73 (0.077)	21.33% (48)	5.78% (13)	1.00 (0.003)	12.25
<i>Avitellina centripunctata</i>	45.14% (79)	28.00% (49)	0.98 (0.082)	17.33% (39)	5.33% (12)	1.21 (0.003)	22.375
<i>Moniezia expansa</i>	34.29% (60)	12.00% (21)	2.19 (0.001)	21.33% (48)	5.78% (13)	1.19 (0.002)	17.75
<i>Strongyloides papillosus</i>	33.71% (59)	10.86% (19)	1.09 (0.053)	12.00% (27)	5.33% (12)	1.15 (0.002)	14.625
<i>Trichuris discolor</i>	22.86% (40)	15.43% (27)	1.97 (0.013)	8.00% (18)	1.33% (03)	0.91 (0.001)	11
<i>Trichuris globulosa</i>	26.86% (47)	3.43% (6)	1.73 (0.028)	23.11% (52)	3.56% (8)	1.03 (0.003)	14.125
<i>Gongylonema verrucosum</i>	21.14% (37)	14.29% (25)	2.04 (0.040)	5.78% (13)	7.11% (16)	1.04 (0.002)	11.375

Odds ratio was computed by considering males (Young & adult) as group 1 and females (Young & adult) as group 2 (Young < 2 years, Adults ≥ 2 years).

The helminths recorded in this study have also been reported previously in other areas of Pakistan (Raza *et al.*, 2007) and elsewhere in the world (Wadhwa *et al.*, 2011). However, results of present study revealed more variety of helminths fauna than previously reported in Pakistan (Raza *et al.*, 2007). *Gastrothylax crumenifer*, *Paramphistomum explanatum*, *Cotylophoron cotylophorum*, *Avitellina centripunctata*, *Strongyloides papillosus* and *Gongylonema verrucosum* were not observed previously in buffalo population of Pakistan. This difference may be attributed to geo-climatic conditions, availability of suitable intermediate hosts and socio-economic status of the farmers contributing towards conducive environment for development and growth of the parasites.

Helminthiasis was more prevalent in males in this study, which is in contrast to the popular concept that females are more heavily infected with parasitic infection due to stress during pregnancy, parturition and lactation (Valcárcel and Romero, 1999). This discrepancy may be associated with traditional practices in the study area. Males were preferred for grazing on the river sides and since had more chances to expose to contaminated pastures, in addition to, improper management and care (Lashari and Tasawar, 2011).

Calves harboured more intensity (eggs per gram of feces) of helminthiasis in this study. It might be speculated that the younger animals picked up infection from older ones during mixed-age group grazing, preferred in study area. The high worm burden in calves suggested the establishment of parasites in host due to lack of innate as well as acquired immunity particularly against *Toxocara vitulorum*, *Strongyloides papillosus*, *Gastrothylax crumenifer*, *Trichuris globulosa*, *Moniezia benedeni* and *Fasciola gigantica* and lack of pasture recovery time (Koinari *et al.*, 2012).

Interestingly, calves of both sexes had high prevalence of helminthiasis, while adult males had more magnitude of infection than female adults. This indicated sex-parasite interaction driven by different hormones in male and females like androgen and estrogen (Bilbo and Nelson, 2001). This phenomenon is further supported by Seli and Arici (2000) who concluded negative impact of testosterone on immunity. This might be an explanation of vulnerability of the adult males to parasitism (Roberts *et al.*, 2001).

The study was conducted through random sampling during May and June, so, the seasonal effect could not be ascertained. Overall high prevalence of the GIH correlates well with socio-economic status of the farmer community of the study area, who had not been habitual to use anthelmintic due to unawareness, poor literacy rate and financial constraints.

References

- Abbas, R.Z., D.D. Colwell, Z. Iqbal and A. Khan, 2014. Acaricidal drug resistance in poultry red mite (*Dermanyssus gallinae*) and approaches to its management. *World Poult. Sci. J.*, 70: 113–124
- Ayaz, M.M., M.A. Raza, S. Murtaza and S. Akhtar, 2013. Epidemiological survey of helminths of goats in southern Punjab, Pakistan. *Trop. Biomed.*, 30: 62–71
- Anonymous., 2012. *Economic survey of Pakistan*. Economic advisor wing, Finance Division, Government of Pakistan, Islamabad, Pakistan
- Bilbo, S.D. and R.J. Nelson, 2001. Sex steroid hormones enhance immune function in male and female Hamsters. *Amer. J. Physiol.*, 280: 207–213
- Farooq, Z., S. Mushtaq, Z. Iqbal and S. Akhtar, 2012. Parasitic helminths of domesticated and wild ruminants in Cholistan desert of Pakistan. *Int. J. Agric. Biol.*, 14: 63–68
- Goraya, K., Z. Iqbal, M.S. Sajid and G. Muhammad, 2013. Frequency distribution of equine diseases in three metropolises of the upper Punjab, Pakistan. *Int. J. Agric. Biol.*, 15: 1067–1074
- Iqbal, Z., M.S. Sajid, A. Jabbar, R.Z. Abbas and M.N. Khan 2006. *Techniques in Parasitology*, pp: 35–40. Higher Education Commission of Pakistan, Islamabad,
- Kanyari, P.W.N., J.M. Kagira and R.J. Mhoma, 2009. Prevalence and intensity of endoparasites in small ruminants kept by farmers in Kisumu Municipality, Kenya. *Livestock Res. Rural Dev.*, 21: 1–10
- Khan, M.N., T.U. Rehman, M.S. Sajid, R.Z. Abbas, M.A. Zaman, A. Sikandar and M. Riaz, 2013. Determinants influencing prevalence of coccidiosis in Pakistani buffaloes. *Pak. Vet. J.*, 33: 287–290.
- Koinari, M., S. Karl, U. Ryan and A.J. Lymbery, 2012. Infection levels of gastrointestinal parasites in sheep and goats in Papua New Guinea. *J. Helminthol.*, 87: 409–415
- Lamy, E., S.V. Harten, E. Sales-Baptista, M.M. Guerra and A.M. Almeida, 2012. Factors influencing livestock productivity. In: *Environmental Stress and Amelioration in Livestock Production*. Pp: 19–51. S. Veerasamy Sejian, S.M.K. Naqvi, T. Ezeji, J. Lakritz and R. Lal (Eds). Springer-Verlag, Berlin, Germany
- Lashari, M.H. and Z. Tasawar, 2011. Prevalence of some gastrointestinal parasites in sheep in southern Punjab, Pakistan. *Pak. Vet. J.*, 31: 295–298
- Masood, S., R.Z. Abbas, Z. Iqbal, M.K. Mansoor, Z.U.D. Sindhu, M.A. Zia and J.A. Khan, 2013. Role of natural antioxidants for the control of coccidiosis in poultry. *Pak. Vet. J.*, 33: 401–407.
- Raza, M.A., Z. Iqbal, A. Jabbar. And M. Yaseen, 2007. Point prevalence of gastrointestinal helminthiasis in ruminants in southern Punjab. *Pak. J. Helminthol.*, 81: 323–328
- Roberts, C.W., W. Walker and J. Alexander, 2001. Sex associated hormones and immunity to protozoan parasites. *Clin. Microbiol. Rev.*, 14: 476–488
- Seli, E. and A. Arici, 2002. Sex steroids and the immune system. *Immun. Allergy Clin. North Amer.*, 22: 407–408
- Simpson, H.V., 2000. Pathophysiology of abomasal parasitism: is the host or parasite responsible? *Vet. J.*, 160: 177–191
- Valcárcel, F. and C.G. Romero, 1999. Prevalence and seasonal pattern of caprinetrichestrongyles in a dry area of central Spain. *J. Vet. Med.*, 46: 673–680
- Wadhwa, A., R.K. Tanwar, L.D. Singla, S. Eda, N. Kumar and Y. Kumar, 2011. Prevalence of gastrointestinal helminthes in Cattle and buffaloes in Bikaner, Rajasthan, India. *Vet. World*, 4: 417–419
- Zajac, A.M. and G.A. Conboy, 2006. *Veterinary clinical parasitology*, 7th edn. Wiley-Blackwell, Iowa, USA

(Received 07 December 2013; Accepted 27 December 2013)