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PREVALENCE OF INTESTINAL PARASITES IN MALE AND FEMALE SHEPHERDS OF SWAT, PAKISTAN

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ABSTRACT

A survey was conducted to determine prevalence of intestinal parasites in different seasons in male and female shepherds of Swat, district of Pakistan. Faecal samples of 256 members (159 male and 97 female) of Shepherds families were collected and brought to the Laboratory, Vertebrate Pest Control Institute (VPCI), Southern Zone-Agricultural Research Centre (SARC), Pakistan Agricultural Research Council (PARC), Karachi for examination. The microscopic examination was done by Wet Mount Techniques (WMT), floatation and sedimentation techniques. Of these 203 (79.2%) harboured parasites. From 203 infected samples 103 had one parasite species, 57 had two, 31 had three and 12 had four parasitic species. Helminthic infestation included *Ascaris lumbricoides* (108, 30.1%), *Trichuris trichura* (57, 15.9%), *Enterobius vermicularis* (37, 10.3%), Hook worm (24, 6.70%), *Taenia saginata* (59, 16.4%) and *Hymenolepis nana* (25, 6.98%), *Entamoeba histolytica/dispar* (26, 7.26%) and *Giardia intestinalis* (21, 5.86%). Males were found more infected than female.

Key Words: Shepherds, Swat, Intestinal parasites.

NTRODUCTION

Man is a potential host for a wide variety of protozoan and helminth parasites (Peng et al 1998); Pawlowski and Lindberg, 1996). Various surveys for intestinal parasites, have been conducted in different provinces of Pakistan: Multan, Bahawalpur and Peshawar (Farooqi, 1964), Multan (Farooqi, 1965; Haleem, 1965), Karachi (Ansari and Naru, 1968), Lahore (Pal and Malik, 1979), Islamabad (Siddidi and Bano, 1979), Peshawar (Bilqees *et al*., 1982), Karachi., Pal and Rana (1983) Rawalpindi-Islamabad., Nawaz and Nawaz (1983) Peshawar., Baqai *et al* (1985) Karachi., Shah *et al* (1986) Hazara Division., Baqai and Zuberi (1986) Karachi., Pal and Subhani (1989) Dir district N.W.F.P., Khan (1993) Hyderabad and Latifabad., Nawaz and Nawaz (1994) Quetta, Baluchistan., Ali (1993) Kurram Agency., Akhtar *et al* (1993) Lahore., Qureshi (1995) Islamabad., Jamil (1999) Islamabad., Stoddart (I999) Chitral,The Northern areas of Pakistan., Shaikh, *et al* (2000) Larkana (Sindh)., Shaikh, *et al* (2003) Shikarpur (Sindh).,Chaudhy, *et al* (2004) Muzaffarabad (Azad Kashmir)., Kamran, *et al* (2005) Karachi. The present study is of particular importance and interest as these parasites have been studied in shepherds of Swat, Pakistan as an occupational base survey not undertaken earlier.

MATERIALS AND METHODS

To record the prevalence of various helminthes and protozoans parasitic infections a cross-sectional survey was conducted from January 2006 to December 2008 in Shepherds of Swat Pakistan. The faecal samples were collected by visiting different rural and urban localities. These localities of shepherds' communities were densely populated and substandard sanitary environment. A profile of 256 individuals including 159 and 97 male and females were submitted and to answer the survey questionnaire (name, age, sex, locality, gastro-intestinal complaints).During the study seasonal and month wise prevalence was recorded. The seasons were identified as: winter (November – March), spring (March-May), summer (May-July) and autumn (August-October). Each of the participants was provided with a clean, dry, screw capped, and wide-mouth plastic container containing 10% MIF (Merthiolate, Iodine, Formaldehyde) preservative. The participants were instructed to collect about 10 grams of personal faecal specimens at the morning. This was a single faecal sample survey. The samples collected were brought to Medical Zoology laboratory, Vertebrate Pest Control Institute (VPCI), Southern Zone Agricultural Research Centre (SARC), Pakistan Agricultural Research Council (PARC), Karachi for laboratory examination. Two smears of each sample prepared by adoption of three techniques namely routine stool examination including lugol's iodine and normal saline, saline sedimentation and formol-ether concentration. Each faecal specimen was processed within 20-30 minutes. For concentrated specimen, the slides # (1×1") were used and examined in a compound microscope under

low (40 X) and high powers (100X) magnifications of two cover slip (22 X 22 mm) after staining with lugols solution. The presence of eggs and larvae of helminthes and protozoa's cysts were confirmed by direct microscopic examination. The photographs were taken by light microscope using fuji colour film with a photomicroscope (Nikon optiphot 2) in the department of Zoology University of Karachi. The data was analyzed statistically.

RESULTS

From January 2006 to December 2008, a total of 256 faecal samples were examined. Of these 203 (79.2%) haboured parasitic infections either in oval and cysts forms (Table 1). Of the 203 shepherds included 127 and 76 male and female had some kind of parasitic infections. The males had prevalence 58.5% and that of females 41.5%. Nine species of parasites, seven helminthes including four nematodes, two cestodes and one trematodes while two species of protozoa's were identified (Table 2). From infected samples, 103(50.7%), 57(28.0%), 31(15.2%) and 12(5.91%) showed one, two, three and four parasite species respectively (Table 3). Helminthic infestation included *Ascaris lumbricoides* 108(30.1%), *Trichuris trichura* 57 (15.9%), *Enterobius vermicularis* 37 (10.3%), Hook worm 24 (6.70%), *Taenia saginata* 59 (16.4%) and *Hymenolepis nana* 25 (7%). While in protozoa's *Entamoeba histolytica* 26 (7.2%) and *Giardia* species 22 (6.12%) were reported.

The data is shown in table 1 evidence was found in faecal samples for the presence of 6 helminths and 2 protozoans. The helminthes infections included nematodes infections i.e *Ascaris lumbricoides* 108(30.1%), *Trichuris trichura* 57 (15.9%), *Enterobius vermicularis* 37 (10.3%), Hook worm 24 (6.70%). Among cestodes i.e *Taenia saginata* 59 (16.4%) and *Hymenolepis nana* 25 (6.98%) While among trematode only one infection of *Fasciola hepatica* was found. In protozoans two parasites: *Entamoeba histolytica* 26 (7.26%) and *Giardia* species 21 (5.86%) were reported. Among nematode infections *A.lumbricoides* were the highly prevalent infection followed by *T.trichura,* and in cestodes *T.saginata*.was with wide distribution as compared to *H.nana* while in protozoan *E.histolytica* had the highest prevalence with respect to *Giardia* species.

Over all prevalence of each helminthic and protozoan species was shown in Table 2. The prevalence and percentage of infection of each parasite was noted. The highest prevalence of helminthes in isolated as well as in association with other helminthes was recorded. While protozoa's are found in low rate of prevalence as compared with helminthes infections in single pattern as well as associated with helminths. No protozoan was found associated with other protozoan.

Table 1. Prevalence of intestinal parasites in relation to sex of individuals in Shepherds of Swat, Pakistan.

Parameters	Male	Female	Total	%
Total samples collected	159	97	256	---
Total samples positive	127	76	203	79.2
Total samples negative	32	21	53	20.7

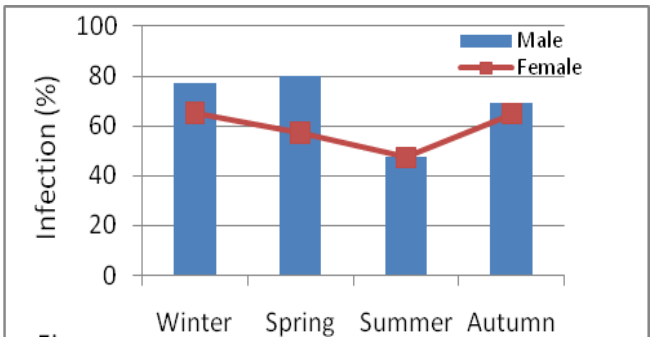
Table 2. Prevalence of intestinal parasitic infections in male and females Shepherds of Swat, Pakistan.

	Parasites	Male	Female	Total	%
Nematodes	*A.lumbricoides*	66	42	108	30.1
	T.trichura	35	22	57	15.9
	E.vermicularis	17	20	37	10.3
	Hook worm	19	5	24	6.70
Trematodes	*F.hepatica*	1	0	1	0.27
Cestodes	*T.saginata*	33	26	59	16.4
	H.nana	15	10	25	6.98
Protozoans	*E.histolytica*	13	13	26	7.26
	Giardia species	11	11	21	5.86
Total		210(58.4%)	149(41.6%)	359	

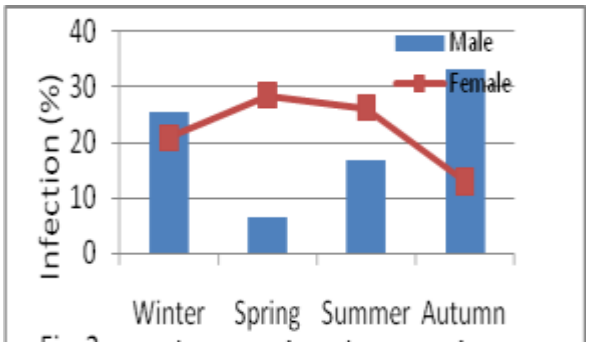
The prevalence rate between the genders are that: nematodes 137(38.2%), 89(24.4%)., cestodes 48 (13.4%), 36 (10.0%) and protozoa's were 33(9.21%), 24(6.70%) in male and females respectively. The male were found to be more infected than female shepherds which may be due to close association with their animals.

Table 3. Prevalence and pattern of helminths and protozoa's parasitic infections in male and female Shepherds of Swat, Pakistan.

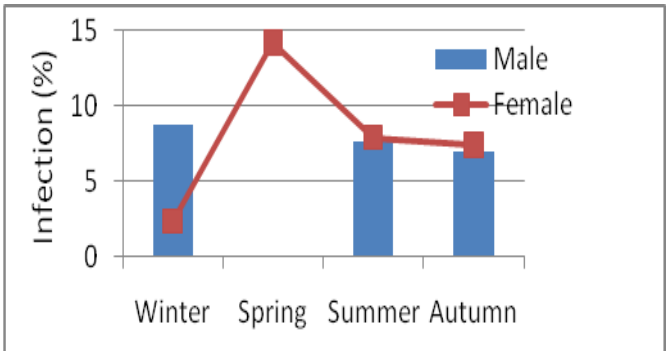
Infection with:	Male	Female	Total	%
Single parasite species	71	32	103	50.7%
Nematodes	51	18	69	33.9%
Cestodes	13	7	20	9.85%
Trematodes	0	0	0	0
Total Helminths	64	25	89	43.8%
Total Protozoans	7	7	14	6.89%
Multiple parasite species	56	44	100	49.3%
Nematodes	17	9	26	12.8%
Cestodes	2	0	2	0.98%
Trematodes	0	0	0	0
Protozoans	0	0	0	0
Helminths+Helminths	21	18	39	19.2%
Helminths+Protozoans	16	17	33	16.2%
Total single+multiple infections	127	76	203	



Nematode



Cestode



Protozoan

Fig.1-3. Seasonal variations of nematodes, cestodes and protozoan parasitic infections in shepherds (male and female) of Swat, Pakistan.

Table 3 Indicating the highest prevalence of helminths in isolated as well as in association with other helminthes. Protozoan were low in prevalence as compared with helminths infections. The single infections were found in 103(50.7%) including 71 (34.9%) in male, 32 (15.7%) in female. 51 (25.1%), 18 (8.86%) nematodes., 13 (6.40%) , 7 (3.44%) cestodes., 7 (3.44%) , 7 (3.44%) protozoans. Multiple parasitic infections were found in 100 (49.3%) individuals including 56 (27.5%), 44(21.6%). Amongst multiple infestation 17(8.37%), 9(4.43%) nematodes., 2(0.98%) cestodes only in male., 21 (10.3%),18(8.86%) helminthes with helminthes.,16 (7.88%), 17 (8.37%) helminthes with protozoans were found in prevalence in male and female respectively. No protozoan+ protozoan and Trematodes+ Trematodes were found in combined fashion.

Nematodes were highly prevalent in spring, winter and autumn. Cestodes were in high prevalence in autumn followed by spring males and females. While male were highly infected with protozoan in winter and female infected highly in spring. No infection of protozoan was found in male in spring season (Fig. 1 to 3).

DISCUSSION

This study was carried out in male and female shepherds of Swat, Pakistan. The shepherds were chosen because they are the integral part of the local population and most of the local population. They are nomadic and travel from place to place in the whole district. Shepherding as an occupation an important part of local economy. Intestinal parasitic infections especially helminthes are widely prevalent in the world and the distribution is correlated to the climatic and environmental factors, socio-economic level, local habits and customs in rural and urban localities. Swat, Pakistan has a population approximately 1.2 million.

In the present study, over all prevalence of parasitic infections shepherds of Swat was 79.2%. These findings are strongly linked to the findings of other workers in Pakistan. The present study showed highest prevalence of infection for *Ascaris lumbricoides* (30.1%) similarly the prevalence of this nematode infection was quite high (68.7 %) in children of Kalasha and Chitral as shown by Stoddart (1999) and around 31.0 % in Kurram Agency as reported by Ali (1993). High prevalence of this nematode for these particular areas might be due to the similar ecological, cultural and geographical associations. Although *A.lumbricoides* has a binormous prevalence, on the contrary to the distribution of other parasites in human populations of Pakistan, the prevalence of *A.lumbricoides* has not been reported in medical students by Farooqi (1965), in Lahore people by Ansari and Naru (1968), Rawalpindi-Islamabad and Dir by Pal and Rana (1983a and 1983b), in hostels of Peshawar University and other universities or hospitals (Nawaz and Nawa, 1993; Kamran *et al.,* 2005; Tasawar *et al*., 2006).

The incidence of *Trichuris trichura* in present study was 15.9 %.similar to the findings of Stoddart (1999) 22.5 % followed by Ali (1993) 7.8%. This parasite is also present in other parts of the country but in low quantity. This nematode has never been found in Multan region of west Pakistan Farooqi (1964, 65), Ansari and Naru (1968), Pal and Rana (1983a and b), Nawaz and Nawaz (1993), Kamran *et al*. (2005), Tasawar *et al*. (2006) report published from time to time.

The prevalence of *Enterobius vermicularis* was 10.3 % in the present study. 8.25% (Pal and Malik 1979) while 13.8 % Jamil (1999).In other studies the prevalence was comparatively low. Ansari and Naru (1968), Pal and Rana (1983a and b), Nawaz and Nawaz (1983), Baqai *et al*. (1985), Nawaz and Nawaz (1993), Stoddart (1999), Chuaudhry *et al.* (2004), Kamran *et al.* (2005), Mehmood *et al.* (2009) have not found this parasite

Prevalence of Hook worm was 6.70% in the present study comparing with 6.1 % Pal and Subhani (1989), 4.23 and 4.27 % prevalence was recorded in Larkana and Shikarpur, Shaikh *et al.* (2000 and 2003). The infection rate was low in other studies investigated. Although the parasite has wide distribution but was never reported by Farooki (1965), Pal and Malik (1979), Siddiqi and Bano (1979), Pal and Rana (1983a and 1983b), Baqia *et al*. (1985), Nawaz and Nawaz (1993), Stoddart (1999), Kamran *et al.* (2005), Tasawar *et al.* (2006), Sajjad *et al.* (2009).

Cameron (1960) observed that in areas between 30 and 40 inches annual rain hook worm infection is light. The eggs of *T. trichura* are much less resistant to temporary drought and heat than are *A. lumbricoides* eggs and will not survive in direct sun rays and intense cold Faust *et al*. (1976). Black and Barrett (1971) have stated that less than 5 % of the cases of *E. vermicularis* never show eggs in the faeces.

Taenia saginata was widely prevalent in the human populations of Swat, Pakistan. It is found to be 16.4 % in prevalence in present study. Other studies conducted in Pakistan showed low prevalence rate except 7.1 %. Akhtar *et al.* (1993), Stoddart (1999) investigated 2.65 % infection rate in Chitral district including Balanguru village where the incidence was 10.6 % which is comparatively high rate of infection recorded in Pakistan after the present investigation. 3.5 % of the prevalence was recorded by Pal and Subhani (1989) in Dir district. This cestode has never been reported by (Farooqi,1964 and 1965), Haleem *et al*. (1965), Ansari and Naru (1968), Pal and Malik (1979), Siddiqi and Bano (1979), Pal and Rana 1983a and 1983b), Nawaz and Nawaz (1983), Baqai *et al*. (1985), Khan *et al*. (1968), Khan *et al* (1993), Nawaz and Nawaz (1993), Chaudhry *et al*. (2004), Kamran *et al*. (2005),

Tasawar *et al.* (2006). The absence of *T. saginata* from these regions of the country is related to the traditional consumption of well cooked meat Ansari *et al*. (1968a). A very high incidence of this tape worm (25-75%) is found in humans of Africa, Tibet and Syria, Chandler and Read (1961) where semi-cooked meat is consumed.

The prevalence rate of *Hymenolepis nana* was 6.98 % in the present study. Farooqi (1964) recorded 3.4% prevalence. Pal and Subhani (1989) recorded 6.6% prevalence. Stoddart (1999) recorded 5.98 % prevalence. Jamil (1999) reported 7.2 % of this infection. Highest prevalence rates of *H.nana* was recorded in studies conducted in Pakistan were that of: Pal and Malik (1979) 21.6 %, Siddiqi and Bano (1979) 18.0 %, Akhtar *et al* (1993) 17.2 %, Shaikh *et al* (2000, 2003) 21.5 %, 20.9 %, in other studies the prevalence was low. This cestode was absent in the studies conducted by Ansari and Naru (1968), Pal and Rana 1983a and b), Nawz and Nawaz (1983), Baqai *et al*. (1985, Nawaz and Nawaz (1993), Chaudhry *et al*. (2004), Kamran *et al*. (2005),

The prevalence of *Entamoeba histolytica* in the present study was 7.26%. Farooqi (1964) recorded 3.5 % in Multan and in Peshawar 8.7 %. The infection rate of this parasite was 11.6 % in Multan medical students Farooqi (1965). In Islamabad school children it was recorded 11.9 % Pal and Malik (1979). In Peshawar school children the prevalence was 14.5 % (Siddiqi and Bano 1979). 60.5% of *E. histolytica* was present in a study conducted in Karachi (Bilqees *et al.,* 1982). The food-handlers in Peshawar University were found infected with 12.6 % with this parasite, (Nawaz and Nawaz 1983). 4.6% infections were found in Lahore (Ansari and Sapru 1964). This protozoan was absent in Bahawalpur, Farooqi (1964),Shah et al (1986), Pal and Subhani (1989), Nawaz and Nawaz (1993), Ali (1993) Qureshi (1995), Jamil (1999), Stoddart (1999), Maqbool *et al.* (2007).

In the present study the prevalence of *Giardia* species was 5.84% in the Shepherds population of Swat, Pakistan. The prevalence is similar to findings reported earlier from Pakistan. In hospital children in Bahawalpur it was reported as 4 %, Farooqi (1964). 5.4 % Haleem *et al.* (1965). 5.0 %, Baqai (1985). The highest infection rates of this parasite were 43.7 %, 41.9 %, 50.8 %, 38.5 %, 39.1 % recorded Baqai and Zuberi (1986) from Karachi, Pal and Malik (1979) Islamabad, Kamran *et al.* (2000) Karachi, Shaikh *et al*. (2000) Larkana, Shaikh *et al*. (2003) Shikarpur. This parasite is never been found in shah *et al.* (1986), Pal and Subhani (1989), Ali (1993),Qureshi (1995), Jamil(1999), Stoddart(1999), Tasawar (2006).

Conclusively *A. lumbricoides, T. trichura* and *T. saginata* are the most prevalent parasites infesting Shepherds of Swat as well as other parts of the country, *E. vermicularis and H. nana* showed the highest prevalence rate in Islamabad (Pal and Malik, 1979), Hook worm infection was highest in prevalence in Peshawar Farooqi (1964), *E. histolytica* and *Giardia lamblia* were the most prevalent parasites in Karachi, (Kamran *et al.*, 2005).

Comparatively low temperatures prevail in Swat district. The rural and nomadic lives, living apart from society, merge responsibilities. They live in small cabins, often shared with their animals and purchasing food from local people. Less often shepherds lived in covered wagons that traveled with their flocks. Shepherding was an isolated and lonely job. The accommodation and nutritional status was usually poor. Such conditions provide a favorable environment for the development of helminth as well as protozoan parasitic infections.

Near to one third of the infected individuals were found with one species of parasite while the other was found multiply infected. In the present study helminths dominating protozoan parasites. Most of the helminth parasites detected were soil-transmitted; this is an agreement with the rate of soil-contamination with helminth parasitic eggs in these areas.

However, different parasites having variable distribution in different parts of the country. Amongst helminthes *A. lumbricoides, T. trichura and T. saginata* were found to be more prevalent infections, on the other hand *E. vermicularis, H. nana* and Hook worms were found in low rate. *E. histolytica* was dominating Giardia species.

The Shepherds being nomadic have difficulty in assessing good health care and basic health education; therefore diseases especially infectious diseases are very prevalent in them. Our findings than other studies conducted in other parts of the country show that intestinal parasitic infections remain highly endemic and appear to be due to faecal contamination of drinking water, Un-hygienic living conditions, poor sanitary behavour, lack of health care and health education. These findings strongly indicate a need for a comprehensive program to combat intestinal parasites a risk factor for the humans of that area. In favour of the present study it was suggested that a campaign of physicians, educationists and mass media should be launched so, as to aware the people about parasitic disease transfer, hygiene and illiteracy.

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