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Original Article

New record of parasitic infection among school children of Lower Dir Pakistan

Novo registro de infecção parasitária entre crianças em idade escolar de Lower Dir Paquistão

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Abstract

Intestinal parasitic infections (IPIs) are a major cause of morbidity worldwide and have been described as an important public health problem. The present study aimed to determine the un usual parasitic infection and identification of risk factors among 4-12years old school age children residing in lower dir district, Pakistan from 2018- 2019. Of the 400 children studied in which the overall prevalence rate for intestinal parasitic infections was found to be 71.75%. Children infected with single parasite accounted for 67.94% and 32.05% were detected with poly-parasitism. *Shistosoma japonicum* (0.69%), *Taxocara spp* (0.69%) and *cryptosporidium* (0.69%), were identified in children living in studied areas. We conclude that there is a need for mass scale campaigns to create awareness regarding health and hygiene in children and the need for development of effective poverty control programmes.

Keywords: new records, *Cryptosporidium* spp, *Schistosoma* spp, *Toxocara* spp, urban areas.

Resumo

As infecções parasitárias intestinais (IPIs) são uma das principais causas de morbidade em todo o mundo e têm sido descritas como importante problema de saúde pública. O presente estudo teve como objetivo determinar a infecção parasitária incomum e a identificação de fatores de risco em crianças de 4 a 12 anos em idade escolar residentes no distrito de Lower Dir, Paquistão entre 2018-2019. Das 400 crianças estudadas em que a taxa de prevalência geral de parasitas intestinais infecções foi de 71,75%, as crianças infectadas com parasita único representaram 67,94%, e 32,05% foram detectadas com poliparasitismo. *Shistosoma japonicum* (0,69%), *Taxocara* spp (0,69%) e *Cryptosporidium* (0,69%) foram identificados em crianças residentes nas áreas estudadas. Concluímos que há uma necessidade de campanhas em grande escala para criar consciência sobre saúde e higiene em crianças e de desenvolvimento de programas eficazes de controle da pobreza.

Palavras-chave: novos registros, *Cryptosporidium* spp, *Schistosoma* spp, *Toxocara* spp, áreas urbanas.

1. Introduction

Intestinal protozoan and helminths are prevalent in those parts of the world where high temperature, poor cleanness, impure water, and imperfect and crowded accommodation exist.

Schistosome infection results from direct contact with fresh water contaminated by free-swimming larval forms of the parasite known as cercariae. Cercariae penetrate to human skin shed their tails, releasing schistosomula which enter to capillaries and lymphatic vessels then transfer to lungs. After several days, the male and female young worms migrate to the portal venous system, where they mature and unite. Adult worm meet then migrate to the veins of the intestines, in the case of *Schistosoma mansoni* and *S.japonicum*, or the bladder with *S. haematobium*. Eggs pass from the lumen of blood vessels into nearby tissues, and then pass to the intestinal or bladder mucosa and are shed with the faeces or urine. The life cycle is completed when the eggs hatch releasing miracidia which infect freshwater snails. After two asexual generations within the snail, mother followed by daughter sporocysts, cercariae are released (Gryseels et al., 2006).

Larval stages of *Toxocara canis* and *Toxocara cati*, common intestinal roundworms of dogs and cats, respectively, sometime infect humans. Toxocara eggs are passed unembryonated in the feces of these animals, become infectious in suitable environments, and can remain infective in the soil for many years .A condition known as covert toxocariasis may be the most common form of the disease and can include symptoms such as headache, cough, fever, and wheezing.

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Cryptosporidium is a zoonotic intracellular spore forming protozoon parasite of the intestinal tract of humans as well as a number of domestic animals (Dozie et al., 2011). Potential sources of cryptosporidium are contaminated food and water, pet as well as farm animals.

Various studies have been published on intestinal parasites infecting different sectors of human population in the region as Khan et al. (2011, 2012, 2014, 2016, 2017a, b, 2018a, b, 2019a, b), Arshad et al. (2019), Khan and Khan (2015), Noor un Nisa et al. (2011), Khan et al. (2020), Iqbal et al. (2021), Khan et al. (2022a), Khan et al. (2022b), Khan et al. (2022c), Ulhaq et al. (2022) and Rahman et al. (2022).

2. Material and Method

2.1. Location and boundary

Lower Dir is the inferior part of the old District Dir of Malakand division. The area of District Dir is 5,284 km^2 and located in Hindu Kush range. These days it forms two districts of Pakistan Upper Dir and Lower Dir (1,585 km. About all of it connects in the valley of the Panjkora which elevated in the Hindu Kush at Lat. 35.45 and joins the Swat River close to Chakdara, where the district is typically entered, at Lat. 34.40.

2.2. Questionnaire survey

The questionnaire was organized to elicited information on the demographic data (age and gender) as well as socioeconomic profile of the inhabitants .On 1st day of record of survey, all students present was informed about the disadvantages of parasites which lives in digestive system particularly small intestine and then provided with empty fecal bottle, label with student name, class and age. Each student was called to carry back the bottle with a fresh fecal sample after that morning. Fecal samples was collected as of every of students on 2nd day, these fecal bottles was preserve in 10% formalin, and was shifted to, Laboratory of Parasitology, where the samples was examined with the help of light microscope by using direct smear technique in Lugol's solution and usual salt solution (WHO, 2013). Those students who are positive for parasitizes was educated to please make contact with their existing specialist /physician to their parents/guardian, brother or either other warden.

2.3. Laboratory examination

Then a stool sample was taken to microscopic examination, with the help of wet-mount techniques (salt solution and Lugol's iodine solutions). The formol-ether concentration was also used for the verification of negative cases to be positive. About 3 g of stool was emulsified in 3 drops of salt solution (0.9%) or Lugol' siodine solution (WHO, 2013). One drop of the suspension was placed on the centre of the slide via wooden applicator and after that a cover-slip was sited. The slide with sample suspension was study with help of the light microscope first under low 10× and then high 40× power objectives. Salines direct smear was also used for the detection of *tapeworm* eggs. At the end of direct stool examination, one gram 125 of every stool sample was emulsified in 10% formalin solution and formol-ether concentration technique was perform as describe in another place in order to raise the possibility of detecting parasites (WHO, 2013).

2.4. Parasite identification

Intestinal parasite was examined under the microscope and was recognized based on morphological characteristics of eggs, larvas and adult stages through valid and standard keys.

2.5. Statistical analysis

The statistical measurement was made according to the result we was use the software (SPSS, Graph paid and Minitab) wherever applicable. P value when less than 0.05 will be measured statistically important.

3. Result

The overall prevalence of intestinal parasite was 71.75% (n=287/400). Multiple parasitic infections were identified in 32.05% (n=92/400) individuals. The most common prevalent parasite is *taxocara*, *cryptosporidium* (0.69%), *Cryptosporidium* spp (0.69%), and *shistomasoma iapanicum* (0.34%). The prevalence of intestinal parasites was at least a single infection was 195 (67.94%). Mixed infection was observed in 92 (30.05%) among school children who had intestinal parasitic infection. Of these, proportion 53 (18.46%) are double, 27 (8.36%) triple and 12 (4.18%) quadruple infections were noted (Tables 1 to 4).

Table 1. Proportion of mono-parasitism and di -parasitism of intestinal parasitic infections in school children of Lower Dir, Pakistan.

Type of infection	No. of species	Species associated	Cases (%)
	1species (n=5)	*Taxocara spp*	2 (0.69)
		Cryptosporidium sp	2 (0.69)
		Shishtosoma japanicum	1 (0.34)
Total mono -parasitism			5 (1.25)
	2 species (n=4)	*T. saginata, cryptosporidium*	2 (0.69)
		A. lumbricoides, Taxocara spp	2 (0.69)
			4 (1)
Total poly parasitism			4 (1)
Total of infected individuals			287 (71.7)
Total No. Examined			400

Table 2. Frequency distribution of intestinal parasites identified from school children stools.

Group	Parasite species	Population infected	Prevalence (%)
Helminth	*Ascaris lumbricoides*	**95**	**33.1**
	Taenia saginata	**65**	**22.64**
	H*ook* worms	**57**	**19.86**
	Hymenolepis nana	**54**	**18.81**
	Enterobius vermiculari	**4**	**1.39**
	Hymenolepis.diminuta	**4**	**1.39**
	Trichuris trichura	**3**	**1.04**
	Shistosoma japanicum spp	**1**	**0.34**
	Taxocara spp	**2**	**0.69**
Total helminth infection		**285**	**99.3**
Protozoan	*Cryptosporidium* spp	**2**	**0.69**
Total protozoan infection		**2**	**0.69**
Total number of infection		**287**	**71.75**
Total number of individual			**400**

Table 3. Prevalence of intestinal tapeworms, nematodes, trematodes and protozoan parasitic infections among school children in lower dir KP, Pakistan (January 2018 to December 2020).

Parasite	Ages		Sex		Over all	%
	<8	>8	Male	Female		
Nematode						
Ascaris lumbcoides	**57**	**38**	**77**	**18**	**95**	**33.1**
Ancylostoma duodenale	**30**	**27**	**41**	**16**	**57**	**19.86**
Enterobius vermicularis	**3**	**1**	**3**	**1**	**4**	**1.39**
Trichuris trichura	**3**	**-**	**3**	**-**	**3**	**1.04**
Taxocara spp	**1**	**1**	**1**	**1**	**2**	**0.69**
Cestodes						
Taenia saginata	**45**	**20**	**48**	**17**	**65**	**22.64**
Hymenolepis nana	**36**	**18**	**45**	**9**	**54**	**18.81**
Hymenolepis diminuta	**3**	**1**	**2**	**2**	**4**	**1.39**
Trematoda						
Schistosoma japonicum	**1**	**-**	**1**	**-**	**1**	**0.34**
Protozoans						
Cryptosporidium spp	**1**	**1**	**1**	**1**	**2**	**0.69**
Total No. of infection					**287**	**71.75**
Total No. of samples						**400**

Table 4. Association of socio-demographic factor with intestinal parasitic infection among school children urban areas of Lower Dir KP, Pakistan.

variable		Individual		Parasitic infection		2(0.69)	1(0.34)	2(0.69)
		frequency	%	frequency	%	*Taxocara spp*	*Schistosoms japonicum*	*Cryp[tosporidium spp*
sex	male	400		287				
Ages (year)	5-6	109	27.25	75	26.13	1(100)	-	-
	7-8	102	25.5	95	33.10		1(100)	-
	9-10	100	25	87	30.31	-	-	1(100)
	11-12	89	22.25	30	10.45	1(100)	-	1(100)
Grade level	1st	77	19.25	56	19.51	-	-	-
	2nd	95	23.75	58	20.20	-	1(100)	1(100)
	3rd	83	20.75	67	23.34	1(100)	-	1(100)
	4rth	67	16.75	52	18.11	-	-	-
	5th	78	19.5	54	18.81	1(100)	-	-
Height (inches)	40-50	145	36.25	133	46.34	-	-	-
	50-60	183	45.75	107	37.28	-	1(100)	1(100)
	60-70	64	16	47	16.37	-	-	1(100)
Weight (K.G)	15-30	211	52.75	144	50.17	-	1(100)	-
	30-45	95	23.75	80	27.87	1(100)	-	1(100)
	45-60	94	23.5	63	21.95	1(100)	-	1(100)

4. Discussion

In current study the prevalence of *Toxocara spp* is 0.69% (287) which is negligible as compare to other study 10% conducted in Prague, rural areas, and shelters of the Czech Republic through faecal microscopy (Dubná et al., 2007), 9.25% conducted in Lahore (Farooqi et al., 2014). The prevalence rate was higher 1.3% in different parts of the world than the present study. *Taxocara spp* reported 2.5% in Spain (Causapé et al., 1996). The soil of the kennels and public parks of the city is heavily contaminated with faeces of stray dogs. It is suggested to reduce the stray dogs in public parks and interference measures are necessarily to reduce the risk of transmission of parasites from dogs to humans.*Cryptosporidium spp* are intestinal protozoan parasites play important role in medical and veterinary science that infect humans and animals all over the world including Pakistan (Kotloff et al., 2013). In humans there are about 20 Cryptosporidium species were observed, in which *C. hominis* and *C. parvum* are the most common species (Ryan and Xiao, 2014). It has major public health problems because infection can result from exposure to low doses of *Cryptosporidium oocysts* (Gatei et al., 2006). Each of them have different sources of infection, transmission routes and pathogencity (Cama et al., 2007). In healthy individuals, cryptosporidium infection causes a self-limiting diarrheal disease (Hunter et al., 2004). Cryptosporidium oocysts were identified in 2 school children (0.69%), but there is no data recorded which is lower than the rate of infection in current 0.69% data . In the present study the presence of *C. parvum* in young children (aged 5-12years) was addressed in geographic regions of District lower Dir by examining both asymptomatic and symptomatic school children. This prevalence rate is lower than the previous studies 83.8%, reported from Peshawar (Mumtaz et al., 2010) 15.99% in Lahore (Khan et al., 2017) 14.66% in Peshawar (Akbar et al., 2015). *Schistosoma japonicum* (Oriental blood Fluke. The parasitic worms have a complex developmental cycle that involves infection of freshwater intermediate molluscan hosts and the blood stream of mammals. *Schistosoma japonicum* is the rare prevalent i.e 0.34% (287) in urban region District Lower Dir which is lower than other studies conducted in different areas of Pakistan.School children infected with the ingestion of eggs, cysts or oocysts with help of infected food or water, hands, inhalation of dirty air, and penetration of larvae to the skin (Lee et al., 2010).

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