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Prevalence of Intestinal Parasitic Pathogens Among Gastroenteritis Patients in District Gilgit, Gilgit-Baltistan, Pakistan

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Abstract.- Intestinal parasitic infections are widely prevalent in developing countries due to poor sanitation, and inadequate personal hygiene. The purpose of our study was to estimate the prevalence of Intestinal Parasitic Pathogens among Gastroenteritis Patients in District Gilgit, Pakistan. A total of two hundred thirty seven fecal samples of the suspected referred gastroenteritis patients at District Headquarter Hospital Gilgit laboratory were analyzed for pathogenic parasitic infections. Out of 237 examined fecal samples by wet mount of fresh normal saline and iodine preparation 51.5% (122 cases; 95% Confidence Interval (C.I.): 45.1%, 57.8%) were found infected with different protozoan and helminth parasites. There were four types of helminth and two types of protozoan parasites found in the examined fecal specimens. Among the protozoans the highest frequency 19.8% (47 cases) of *Giardia lamblia* followed by 2.5% (6 cases) *Entamoeba histolytica* and among the helminthes the highest frequency 22.8% (54 cases) was noted for *Ascaris lumbricoides* followed by 4.6% (11 cases) *Hymenolepis nana.* Other helminthes found were *2.5*% (6 cases) *Trichurus trichiura*, 1.7% (4 cases) *Taenia saginata.* There were 1.68% (4 cases) of mixed infestations of *A. lumbricoides and T. trichura* while 0.84% (2 cases) had *A. lumbricoides and G. lamblia.* Majority of the study participants were males (60%; 142 cases). The infestation was higher in the 1-5 years age group as compared to others.

Key words: Prevalence of intestinal parasites, intestinal parasites, parasitic infections in Gilgit

INTRODUCTION

The Northern Areas of Pakistan is an isolated mountainous terrain spread over an area of 72,500 Km^2. It is situated between 35-37° N latitude (ranging from approximately 1400 to 8000 meters above the sea level) and is covered by high mountains. It borders the Xinjiang Province of Republic of China on the North East, the Khyber Pakhtunkhwa (KPK) Province of Pakistan on the South, Kashmir on the East and Afghanistan in the North (Fig. 1).

Gilgit-Baltistan is the least developed area of Pakistan and Gilgit city has a population of 870,347 according to 1998 census with an annual growth rate 2.47%. The per capita income is Rs. 7260 per year and literacy rate is 62.1%. Available agriculture land is 4% of the entire area and 4% of the whole population is involved with agriculture (Khan and Khan, 1992). The current study area is in the centre of Gilgit and is very congested and glacier water is used for drinking, cooking and also for agriculture.

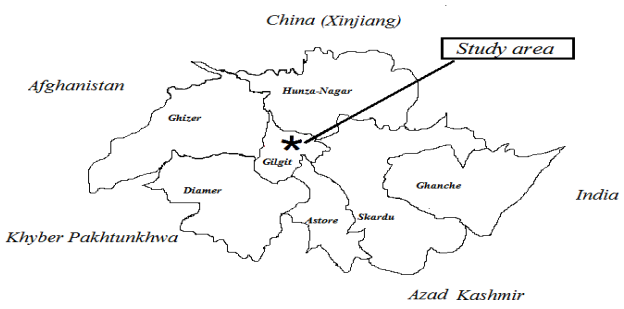

Fig. 1. Map of study area.

Intestinal parasites include both Protozoa and helminths in human and other animals (Loukopoulos *et al*., 2007). The parasites are mostly causative agents of gastrointestinal diseases with symptoms such as lack of appetite, vomiting, diarrhoea, dysentery and sometimes mentally related disorders (Benthny *et al*., 2006). The transmission of these parasites is feco-oral (Sayyari *et al*., 2005; Bethony *et al*., 2006) and is caused by contaminated water or dirty hands, uncooked or unwashed food and/or by skin contact with contaminated soil.

Intestinal parasitic infections are among the most common infections in the world and are responsible for considerable morbidity and mortality

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(Kongs *et al*., 2001; Mbuh *et al*., 2010). Their infections on human population are globally endemic (Mehraj *et al*., 2008) however, their incidence and intensity is greatest in developing countries and causes considerable medical and public health problem in the tropical countries (WHO, 1981; Shaikh *et al*., 2009; Naish *et al*., 2004). Worldwide it affects about 3.5 billion people (Shahya *et al*., 2009). Approximately 300 million people are severely ill with intestinal parasites and of those at least 50% are school age children (Mehraj *et al*., 2008). Intestinal parasites rarely cause death but because of the size of the problem, the global numbers of related deaths are vast (WHO, 2006). The high prevalence of these infections are closely related with low socio-economic status, poverty, illiteracy, poor hygiene, lack of access to potable drinking water and sanitation facilities (Montresor *et al*., 1998; Hotez *et al*., 2004; Khan *et al*., 2004).

Rijal *et al.* (2001) in their study conducted in rural school adolescent children in Nepal (12-20 years old) found the prevalence of intestinal parasitic infection of 40% and they deduced that the infestations were due to lack of health awareness. In India, Rao *et al. (*2003) found 59.5% infestation of the intestinal parasites in adolescents (11-19 years old) from 27 villages of Kundum block Jabalpur district of Madhya Pardash. In Pakistan, the prevalence of intestinal parasites is very common: in rural areas of Karachi it was reported as 47.5% (Siddiqui *et al*., 2002), 35% in Sukkur Sindh (Shaikh *et al*., 2009), 29.26% in Muzaffarabad (Chaudhry *et al*., 2004) and Khan *et al.* (2012) found 63.4% infestations of intestinal pathogenic parasites in children and 69.2 % in adult individuals involved in education (students, staff and workers) belonging to Swat, Khyber Pakhtunkhwa, district Swat.

The Gilgit-Baltistan population is at high health risk due to its unsafe potable drinking water (Ahmed *et al*., 2012) and lack of sanitation facilities (Ahmed *et al*., 2003). Many outbreaks of cholera and diarrhea and dysentery diseases due to bacteria have been reported (Ahmed and Shakoori, 2002; Ahmed *et al*., 2003, 2005). The parasitical etiological agents of gastrointestinal patients have been reported once by Waqar *et al*. (2003) from two highland communities of Northern Pakistan.

This present study on the prevalence of intestinal parasitic infections is important because it reflects the sanitation and microbiological quality of drinking water of the communities and will provide basic data for the control of the parasitosis in the future. This study aims at estimating the prevalence of intestinal parasites in suspected gastrointestinal patients of human population of Gilgit-Baltistan.

MATERIALS AND METHODS

Two hundred and thirty seven human fecal samples from the suspected gastroenteritis patients from all age groups and both sexes were collected during June to October 2008 in clean open mouth disposable plastic containers at District Headquarter Hospital Gilgit Laboratory and allotted the identification number. Information about the name of patient, age, sex was recorded on stool examination forms and in the record register. Fecal samples were examined within 4 h by temporary mounts in order to diagnose the parasites (Cable, 1985).

Preparation of temporary mounts of fecal samples

Approximately 1 mg of fecal sample was picked with a wooden applicator and mixed with a drop of normal saline placed earlier on a glass slide, covered with a cover glass and examined under the light microscope. A drop of Lugol's iodine was placed at the edge of the slide and again observed under the microscope for the presence and identification of parasites. The percentage of the parasites was calculated in order to find out the distribution pattern of each parasite.

Statistical analysis

The frequencies of age group and sex of patients were generated and different parasites found in the fecal samples were reported. The prevalence of intestinal parasites in suspected gastrointestinal patients by type of parasites and age group (in years) with 95% confidence interval were also computed.

RESULTS

A total number of 237 human fecal specimens

were investigated from suspected gastrointestinal patients for the presence of various pathogenic intestinal parasites. One hundred and forty two (60%) of these specimens were taken from males. Similarly, one hundred and forty five (61.2%) of the subjects were either younger than or 15 years, while about 9% (41) subjects were over 25 years.

The prevalence of intestinal parasitic pathogens among gastroenteritis patients was found to be 51.5% (n=122; 95% C.I.: 45.1%, 57.8%). The most common intestinal parasite was *Ascaris lumbricoides* (54 out of 122 infected) followed by *Giardia lamblia* (47 out of 122 infected). The prevalence's with 95% confidence by types of intestinal parasites infections are provided in Table I.

Table II shows that mixed parasitic infections were found in six specimens out of which four had *A. lumbricoides* and *T. trichiura* and two specimens had *A. lumbricoides* and *G. lamblia*.

Table I.- Prevalence (95% confidence interval) of intestinal parasitic infections in Gilgit, Pakistan

Type of intestinal parasites	No. of specimens infected	Prevalence (95% confidence interval)
Protozoa		
Giardia lamblia	47	19.8% (14.8%, 24.9%)
Entamoeba histolytica	06	2.5% (0.5%, 4.5%)
Helminths		
Ascaris lumbricoides	54	22.8% (17.4%, 28.1%)
Hymenolepis nana	11	4.6% (2.0%, 7.3%)
Trichuris trichiura	06	2.5% (0.5%, 4.5%)
Taenia saginata	04	1.7% (0.0%, 3.3%)

Table II.- Distribution of specimens with mixed parasitic infections in Gilgit, Pakistan.

Mixed parasites	Number of specimens infected	Prevalence (%)
A. lumbricoides and *T. trichiura*	4	1.68
A. lumbricoides and *G. lamblia*	2	0.84
Total	6	2.53

Table III shows the age distribution of suspected gastroenteritis patients by prevalence of intestinal parasites infections. The prevalence of intestinal parasites infections were found more common among young individuals and less common among older individuals.

Table III.- Age-wise distribution of suspected gastrointestinal patients referred to laboratory for investigation by prevalence of intestinal parasitic infections.

Age (Years)	No. of specimens investigated	No. of specimens infected	Prevalence (%)
1-5	41	28	68.3%
6-10	62	40	64.5%
11-15	42	16	38.1%
16-20	32	16	50.0%
21-25	19	10	52.6%
26-30	20	09	45.0%
31-35	08	01	12.5%
36-40	06	01	16.6%
41-45	04	01	25.0%
46-50	03	00	00.0%

DISCUSSION

Prevalence of intestinal parasites in human population is generally related to the area's environmental conditions and socio-economic status of the inhabitants such as personal and environmental hygiene, availability of health facilities sanitation practices and facilities and supply of sufficient potable drinking water. The results obtained in this study indicate that the prevalence of human intestinal parasites (helminth and protozoa) is very high as compared to some other studies conducted in the native country. These studies were reported by Siddiqui *et al*. (2002) in rural Karachi, Chaudhry *et al*. (2004) in children of Muzaffarabad city, except study of Khan *et al*. (2012) in Swat, Khyber Pakhtunkhwa province, Ullah *et al*. (2009) and were much higher than from some studies conducted abroad as Masuccl *et al*. (2011) in Italy in a hospital based study, Mbuh *et al*., 2010 in gastrointestinal disorder out patients in Buea Sub Division Cameroon, Adhikari *et al*. (2007) conducted in 5-14 years school children in Kathmandu Valley. This high level of incidence of

intestinal parasitic infestation may be due to risk factors prevailing in the poor countries, for example, highly contaminated drinking water (Ahmed *et al*., 2012) and unsafe traditional sanitation facilities (Ahmed *et al*., 2003).

The parasite species found in this study are similar to those reported earlier from various regions and no parasite was specific to the region. The intensity of occurrence of various parasites though varied from area to area in this study. The *A. lumbricoides* was the most common parasite found in highest quantity as reported earlier on by others (Khan *et al*., 2004; Ullah *et al*., 2009; Malla *et al*., 2004). Dash *et al.* (2010) in their study conducted in Sharja, United Arab Emirate reported *E. histolytica* as the most common parasite followed by *Blastocystis hominis*, Masuccl *et al.* (2011) in Italy found *B. hominis.* Sharma *et al*. (2004) also isolated the same parasites in their study in Nepal. Chaudhry *et al.* (2004) found *G. lamblia* in their study in Muzaffarabad and Adhikari *et al*. (2007) found the *T. trichiura* was the most common parasite in school children in Kathmandu valley. Arani *et al*. (2008) in their study in South of Tehran, Iran found *B. hominis* and *G. lamblia* the most common parasites. This variation may be attributed to different socio-economic conditions of these areas (Tasawar *et al*., 2010).

In this study, the parasitic infections had association with different factors like age and sex of the patients. The children <5 years of age were much more affected compared to 6-10 years suspected patients. The children < 5 years of age were not aware of personal hygiene education which played a main role in transmission of parasitic infections. Similar results have been reported by Chaudhry *et al*. (2004) and Khan *et al*. (2004) who conducted their studies in Muzaffarabad and Azad Kashmir and showed that children < 5 years were more affected compared to adults. Gender wise infestation was also high in males then females. Chaudhry *et al*. (2004) reported similar results from Muzaffarabad whereas Khan *et al*. (2004) did not find such relationship. The gender is not a risk factor and it does not contribute to prevalence of intestinal parasitic infections. In our study, this may be due to the community of Gilgit-Baltistan which is male dominant and females do not avail of health facilities independently or without the permission of their males. Moreover, the females are shy and usually self medicate. The male caretaker/partners consult the physicians on their behalf and get the treatment on the basis of symptoms.

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