INNSPUB

International Journal of Biosciences | IJB |
ISSN: 2220-6655 (Print), 2222-5234 (Online)
http://www.innspub.net
Vol. 16, No. 5, p. 54-59, 2020

RESEARCH PAPER OPEN ACCESS

Incidence of intestinal protozoan infection in the children of urban and pre-urban areas of Quetta district

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Key words: Incidence, Intestinal protozoa, Infection, Children, Quetta district, Balochistan.

http://dx.doi.org/10.12692/ijb/16.5.54-59 Article published on May 15, 2020

Abstract

The current study was conducted during June 2018 to May 2019 in rural and pre-urban areas of Quetta district to examine the incidence of intestinal protozoan parasitic infections. In this study the children were divided into three age groups ranging from 1-5, 6-12 and 13 to18 years. A total number of 806 stool samples were collected from different parts of Quetta district and analyzed in the pathological laboratories. The stool samples were examined microscopically by using iodine and saline solutions to identify cyst and trophozoite stages of protozoa respectively.The Overall incidence of intestinal protozoan parasites was 340(42.2 %). While 3 species ofprotozoa *Giardia lamblia*, *Entamoebahistolytica*and *Entamoebacoli* were detected with incidence rate of 160(19.8%), 128(15.9 %) and 52 (6.5 %) respectively. The infection rate was observed higher 197(24.4 %) in the age group of 6-12 years followed by 121(15 %) in age group (13-18 years).While children of age group 1-5 years noted the lowest infection rate of 22 (2.7 %).Gender wise infection rate was found higher in male 202(25.1 %) than the in females 138 (17.1 %), this difference was statistically significant. While 5 ethnic groups were determine and observed the highest infection rate in Balochi children96 (12 %) followed by Pathan92 (11.4 %), Sindhi 76 (9.4 %), Punjabi 64 (7.9%) and lowest in Hazara 12 (1.5 %). In the urban population, the Protozoan parasites were found in 129(37.9) % of fecal specimens. *Giardia lamlia ,Entamoebahistolytica*and *E.coli* were the commonest organisms representing 66(8.2%), 43(5.3%) and20(2.5%) respectively, of the overall prevalence rates in the urban population. In the rural population, parasites were observed in 211(26.2%) of fecal specimens. Infection with *Giardia lamlia* was highest 94(11.7%), followed by*Entamobahistolytica* with 85(10.6%) and with *Entamoeba coli* was32 (4%) respectively.

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Introduction

Quetta is the capital and largest city of the province of Balochistan, Pakistan. The population of Quetta District is 2,275,699. It is located at an altitude of 1,680 meters (5,510 feet) above the sea level, making it Pakistan's only high-altitude major city (Census, 2017). Intestinal protozoan infections affectedapproximately 1.5 billion individuals worldwide. These infections are more prevalent in pre-school children and over 600 million school-going children that live in areas where parasitic infections are commonly transmitted (WHO, 2014). In developing countries Intestinal parasitic infections are the greatest causes of illness globally (Brooker *et al.*, 2009). Intestinalprotozoan infections occur especially in school going children in both rural and urban inhabitants, due to their practice of playing with infested soils and ingestion of unhygienic food, water, eating with mud-covered hands and germ-infested toiletpractices (Swanson *et al.*, 2012). These parasites destroy tissues and organs, cause abdominal pain, diarrhea, intestinal interference, anemia, ulcers and other health complications in children These parasites ingest nutrients from children they cause infection, thus hindering their physical development, reduced learning and slow intellectually (Nokes, 1994).In developing countries due to the poor sanitary conditions, usage of unclean drinking water and poor personal hygiene Its frequency is chiefly high.

Amoebiasis and giardiasis is among ten top most Intestinal parasitic infectious diseases worldwide (WHO, 1987). Protozoan parasites are still major health concern in tropical and subtropical areas and are typically found in people with low economic background (Ravdin, 1995). Repeated infections occur in those areas where intestinal parasitic infections are more common so the drug therapy only solve the problem for short term (Luong, 2003).

Previous research studies from Pakistan showed that *Giardia lamblia* is the extremely common parasite in Karachi and after this *Entamoebahistolytica* is second common gastro-intestinal parasite (Mehraj*et al.*, 2008; Siddiqui *et al.*, 2002). The control of infection and treatment should be concentrated on the youngsters because the primary victims of gastro intestinal parasites are children (Abdullah *et al.*, 2017).However, In Pakistan; the parasitic infections are widely prevalent, with variable distribution in different parts of the country. Various surveys have been conducted in different cities of the country (Bilqees, 1982; Ansari, *et al.*, 1966; Ansari and Naru, 1968; Qureshi *et al.*, 1992; Siddiqui and Bano, 1979; Bano and yasmin, 1981; Pal and Subhani, 1989; Ghauri and Alam, 1992; Akhund, 1994; Shaikh *et al.,* 2000; Waqar *et al.*, 2003; Neelofer and Shaukat*at el.*, 2006).

Little work has been done on intestinal parasite in Quetta district. The overall frequency rate of Intestinal Parasites in the Children Hospital Quetta was found as 31% (Wadood *et al.*, 2005). But no such a detail study was conducted in the same areas. The main objectives of the study are to find out the prevalence rate of intestinal protozoan infections in the children of different age groups along with locality, gender and ethnic groups.

Materials and methods

The study was carried out on stool samples which were collected from the children of urban and pre-urban areas of the Quetta district during June 2018 to May 2019. Total 806 cases from different age groups, both sexes and ethnic groups having bowel complains were included in the study. Thesamples were collected in wide mouth container and labeled with name, age, date, area, language and economic status of the patient.After physical examination, The smearof fresh stool samples were examined undermicroscopeby using of the normal saline solution to examine the trophozoite stage of protozoan while iodine solutionwas used for staining of nuclei and intracellular structures of the cystic stage of protozoans. The rest of samples were preserved in 10 % formalin-ether solution. Taxonomic identification of protozoan parasites was carried out with the help of morphological characteristics of Enrique Chacon-Cruz 2003 (Chacon-Cruz, *et al* 2003).

Results

Out of total 806fecal samples of children examined, 340(42.2%) were found positivewith three species of intestinal protozoa.*Giardia lamblia, Entamoebahistolytica* and *Entamoebacoli*. of themthe most common intestinal parasites identified was*Giardia lamblia*160 (19.8%), followed *Entamoebahistolytica*128 (15.9%) and *Entamoeba coli*52 (6.5%) individually (Table1).While, in the locality wise incidence, the highest infection rate211 (26.2%) were observed in the pre-urban areas than of urban 129(16%). The commonest parasite was *Giardia lamblia*, representing 94(11.7%), followed by*Entamobahistolytica* with 85(25%) and *Entamoeba coli*32 (9.41) in the pre-urbanrespectively (Table 1).

Table 1. Overallincidence of intestinal protozoa in the urban and pre-urban areas of Quetta district.

Intestinal protozoa	Urban N=806, n (%)	Pre-urban N=806, n (%)	Total (%)
Giardia lamblia	66 (8.2%)	94 (11.7%)	160 (19.9%)
Entamoebahistolytica	43 (5.3%)	85 (10.6%)	128 (15.9%)
Entamoeba coli	20 (2.5%)	32 (4%)	52 (6.5%)
Total	129(16%)	211(26.2%)	340(42.2%)

Children of three age groups ranging from 1-5, 6-12 and 13 to18 years were included in this study. The age wise infection rate was observed to be high 197 (24.4 %) in the age group of 6-12 years followed by 121(15%) in age group (13-18 years) while children with in the age group 1-5 years recorded the lowest infection rate of 22(2.7%).

It was detected that prevalence increases with advancement in age (Table 2).

Table 2. Age-wise distribution of intestinal protozoan parasites.

Intestinal protozoa	1- 5 years N=806	6-12years N=806	13-18 years N=806	Total (%)
Giardia lamblia	16(2%)	92(11.4%)	52(6.5%)	160 (19.8%)
Entamoebahistolytica	4(0.5%)	76((9.4%)	48(6%)	128(15.9%)
Entamoeba coli	2(0.2%)	29(3.6%)	21(2.6%)	52 (6.5%)
Total	22(2.7%)	197(24.4%)	121 (15%)	340 (42.2%)

It was observed that incidence of protozoa were found ashigh202 (25.1%) in male than of female138 (17.1%). This difference was statistically significant (Table 3). The most common protozoa was again *Giardia lamlia* affected 92 (11.4%) male and 68(8.4%) female, followed by *Entamoebahistolytica* 78(9.7%) and 50 (6.2%), than *Entamoeba coli* 32 (4%) and 20(2.5%) both male and female respectively (Table 3).

Ethnically, thehighest infection rate was observed in Baloch children96 (12 %) followed by Pathan 92 (11.4%), Sindhi 76 (9.4 %), Punjabi 64(7.9%) and lowest in Hazara12 (1.5 %) (Table 4).

Discussion

Intestinal protozoan infections are the common public health problems inthe developing countries. In Pakistan it is also generallydominant with variable distribution indifferent areas of the country. The *Giardia lamblia* and *Entamoeba histolytic* are the two commonest finding in the local population which is present in all ages with variable incidence rate. These two parasites have also been reported to be among the commonest in other studies done in Pakistan.In Rawalpindi, Islamabad incidences of positive cases were 34%(Pal and Rana, 1983) and 14.6% (Qureshi *et al.*, 1992).

Table 3. Incidence of intestinal protozoan parasites according to sex.

Intestinal protozoa	Male N=806, n (%)	Female N=806, n (%)
Giardia lamblia	92 (11.4%)	68 (8.4%)
Entamoebahistolytica	78 (9.7%)	50 (6.2%)
Entamoebacoli	32 (4%)	20 (2.5%)
Total	202 (25.1%)	138 (17.1%)

In Karachi rate of positive fecal samples was 30.04% (Bilqees *et al*., 1982), same result (28.27%) were reported from Nawabshah (Akhund, 1994), Larkana 31% (Shaikh, *et al*., 2000) and shikarpur 33% (Shaikh *et al*., 2003).

Whereas in present study 42.2% cases are positive that showincreased incidence frequency of parasiticinfections from previous study. Sothis increased rate level rate has a need to controlproperly.

In the present study the *Giardia lamblia* is the most common isolated protozoan parasite with incidence rate of (19.8%). But it was reported with increasing rate from Peshawar 23.7 % (Mehmood*et al.,* 2009), Karachi 37.55% (Bilqees*et al*., 1982, Baqai and Zuberi, 1986), Sargoda (Ghouri and Alam, 1992), sukkar 36.19% (Shaikh*et al*., 2009), and other cities (Akhund, 1994; Pal and Rana, 1983).

The incidence rate in children among 6- 12 years of age group was observed to be high than the children above and below the same age group. It was also noted that highest infection rate197 (24.4%) was observed in the age group of 6-12 years, 121 (15%) of 13-18 years age and lowest 22 (2.7%) of age group 1-5 years. The same result was reported in other studies (Ghauri and Alam, 1992), which was noted the highest incidence by *Giardialamblia* (34.77%) and *Entamoebahistolytica* (23.24%) in children of age up to 12years.

Table 4. Incidence of protozoa in different ethnic groups.

Intestinal protozoa	Baloch	Pathan	Sindhi	Punjabi	Hazara	Total (%)
Giardia lamblia	45 (5.6%)	42 (5.2%)	38 (4.7%)	30 (3.7%)	5 (0.6%)	160 (19.9%)
Entamoeba histolytic	40 (5%)	32 (4%)	24 (3%)	28 (3.5%)	4 (0.5%)	128 (15.9%)
Entamoeba coli	11 (1.4%)	18 (2.2%)	14 (1.7%)	6 (0.7%)	3 (0.4%)	52(6.5%)
Total (%)	96 (12%)	92 (11.4%)	76 (9.4%)	64 (7.9%)	12 (1.5%)	340 (42.2%)

There were 202 (25.1%) males and 138 (17.1%) were female patients. It was observed that the percentage of male patients was relatively higher than female's inall age groups.

This is because in our culture males pass most of the time outside the home and are exposed to the external environment much greater to females. All studies show that quite a large number of the population harbors protozoan intestinal parasites with variable percentage in different places of Pakistan. This is mainly due to, lack of health education which promotes the chances of infection as the rural population are not aware about the transmission and prevention of infections, low socio-economic status, poor sanitation, contaminated water supply and warm climate. The infections can be controlled to some extent by overcoming these public health problems.

It is suggested that, investigations for parasitic infections in patients with bowel complaints especially in children may be continuously carried out. There is a need of health education at all levels, education of children in schools on sanitary laws and hygiene, use of boil water for drinking, washing of hands before meal and use of fresh home cooked food.

Conclusion

It is concluded that *Giardia limblia* with infection rate 160(19.8%) is the commonest species followed by *Entamoebahistolytica* 128(15.9%) during entire research work in urban and pre-urban areas of Quetta district, as compare to other intestinal protozoans. Non-pathogenic intestinal parasite *Entamoeba coli*with infection rate 52(6.5%) was less prevalent in Quetta city. The most infected age group from gastro-intestinal parasites is 6-12 years and males are the most victim of infection than females.

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