

Original Article

Prevalence and risk factors associated with human Intestinal Parasitic Infections (IPIs) in rural and urban areas of Quetta, Pakistan

Prevalência e fatores de risco associados a infecções Intestinais Parasitárias (IPIs) em áreas rurais e urbanas de Quetta, Paquistão

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Abstract

Intestinal parasitic infections (IPIs) are endemic worldwide and more prevalent in countries with unhygienic conditions. The objective of the research was to identify the prevalence of intestinal parasitic infections in rural and urban areas of Quetta, Balochistan and to check their associated risk factors including; age, gender, educational status, sanitary system and any other immunodeficiency. For this instance 204 stool samples were collected from the urban and rural population of Quetta, Balochistan. The participants with positive results for Intestinal Parasitic Infections were interviewed using close-ended questionnaire. From the findings of this study, it has been revealed that prevalence of Intestinal parasitic infections in rural and urban areas was 21%. Males were found more prevalent (66%) as compared to females (34%) due to higher risk of contacting to outer environment. The prevalence was higher in rural areas (23%). The most prevalent intestinal parasite was *Entamoeba histolytica* (48%). Other prevailing parasites were *Hymenolepis nana* (26%), *Giardia Intestinalis* (17%), *Trichomonas hominis* (5%) and *Trichuris trichiura* (5%). The majority of patients were having lower socio-economic (52%) and educational status (48%). Educational status of 48% patients was primary or below primary. Most of the participants with positive results did not have hand washing habit (62%) and didn't have the closed sanitary system (71%). The intestinal parasitic infections were more prevalent among children aged from 1-10 (33%). This may be a result of poor hygiene in children. The study will contribute to lower down the prevalence in the studied areas by the application of different preventive measures in future.

Keywords: prevalence, human, intestine, parasites.

Resumo

As infecções parasitárias intestinais (IPIs) são endêmicas em todo o mundo e mais prevalentes em países com condições anti-higiênicas. O objetivo da pesquisa foi identificar a prevalência de infecções parasitárias intestinais em áreas rurais e urbanas de Quetta, Baluchistão e verificar seus fatores de risco associados, incluindo; idade, sexo, escolaridade, sistema sanitário e qualquer outra imunodeficiência. Nesses casos, 204 amostras de fezes foram coletadas da população urbana e rural da região de Quetta. Os participantes com resultados positivos para Infecções Parasitárias Intestinais foram entrevistados por meio de questionário fechado. A partir dos resultados deste estudo, foi revelado que a prevalência de infecções parasitárias intestinais em áreas rurais e urbanas foi de 21%. O sexo masculino foi mais prevalente (66%) em relação ao feminino (34%). A prevalência foi maior na zona rural (23%). O parasita intestinal mais prevalente foi *Entamoeba histolytica* (48%). Os outros parasitas predominantes foram *Hymenolepis nana* (26%), *Giardia Intestinalis* (17%), *Trichomonas hominis* (5%) e *Trichuris trichiura* (5%). A maioria dos pacientes tinha menor nível socioeconômico (52%) e escolaridade (48%). A maioria dos participantes com resultados positivos não tinha o hábito de lavar as mãos (62%) e não possuía o sistema sanitário fechado (71%). As parasitoses intestinais foram mais prevalentes entre as crianças de 1 a 10 anos (33%). Este estudo contribuirá para diminuir a prevalência nas áreas estudadas através da aplicação de diferentes medidas preventivas no futuro.

Palavras-chave: prevalência, humano, intestino, parasitas.

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1. Introduction

Intestinal parasitic infections (IPIs) are more prevalent in developing countries and among people who have unhygienic environment (WHO Expert Committee, 2002). They are highly prevalent in subtropical and tropical countries. Intestinal parasites are estimated to infect about more than one million people. The patients with chronic conditions are about 300 million among which majority is of children (Curtale et al., 1998).

Several activities have been made to control intestinal parasitic infections. These activities include improving sanitation, providing hygienic food and water and proper access to health care professionals and health education (Steketee, 2003).

Intestinal parasites cause retarded growth rate, anemia due to deficiency of iron and mental and physical health problems (WHO Expert Committee, 2002). The most prevalent protozoan parasite is *Giardia lamblia*, which is also known as *Giardia duodenalis/Giardia intestinalis*. About 200 million people suffer from Giardiasis worldwide. The parasitic status of *Blastocystis hominus* is still under debate and it is another common intestinal protozoan (Jasti et al., 2007).

Other most common intestinal parasites are soil transmitted helminths (STHs), such as *Ascaris lumbricoides*, Hookworms and *Trichuris trichiura* (Hwang et al., 2003). About one billion people are infected worldwide with *Ascaris lumbricoides*, which is the most common and the largest helminths (Mehraj et al., 2008). Globally most prevalent common parasite among cestodes is *Hymenolepis nana* (Le et al., 2007). A substantial economic burden is represented by these infections. The prime victims of intestinal parasites are children (Haque et al., 2003). 50% of the patients infected with intestinal parasitic infections are school aged children (Bakr et al., 2009). These parasites affect their attendance of school. Learning abilities, physical development (Hwang et al., 2003) and nutritional status of host may also impure with intestinal parasitic infections.

The susceptibility of parasitic infections may also increase due to under nutrition. In different countries epidemiological researches have shown that Intestinal parasites are endemic due to environmental, sanitary and socio-economic conditions (Curtale et al., 1998).

The diagnosis of Intestinal parasitic infections is done by both clinical and laboratory analysis. Clinical diagnosis is based on several symptoms and laboratory diagnosis is done by processing the fresh stool sample with the direct microscopic technique to detect cysts, trophozoites, eggs and larva of intestinal parasites immediately. The intensity of infection is estimated indirectly by counting the number of eggs per gram of feces (WHO Expert Committee, 2002).

In Pakistan as in many other Sub-Saharan African countries, parasitic infections are widely distributed and affect various segments of the population. However, there is a little information on the prevalence of intestinal parasites among population of Quetta, Balochistan.

The current study was based on the determination and comparison of IPIs prevalence in urban and rural areas of Quetta, Balochistan to correlate them with socio-economic status and associated risk factors (age, education and

sanitary system). This study will contribute to lower down the prevalence in the studied areas by the application of different work plans and preventive measures in future.

2. Materials and Methods

The study was conducted from July to December 2021. The data was collected in order to identify the type of intestinal parasite among patients visiting hospitals for intestinal disease. Prevalence was calculated by the given Formula 1.

$$Prevalence = \frac{\text{Number of people in sample with characteristic}}{\text{Total Number of people in sample}} \times 100 \quad (1)$$

A total 204 samples were collected. The presence of intestinal parasites (egg, cyst, trophozoites) were detected and confirmed in pathology lab of Hospital. Direct saline slide was used to detect the motile trophozoites, while for detailed examination gram iodine smear was used.

After that a questionnaire was filled by interviewing the participants. Questionnaire was mainly formulated in order to collect general demographic information including: education, age, gender, any medical history. Different environmental factors were also considered such as: area where a particular participant was living, the type of sanitary system and the quality of water.

3. Results

Table 1 outlined the gender effectiveness on the prevalence of Intestinal Parasitic Infections (IPIs) in rural and urban areas of Quetta, Balochistan. Total prevalence in rural and urban areas was 21%. The prevalence was higher in rural areas (23%). Males were found more prevalent (66%) as compared to females (34%) (Figure 1).

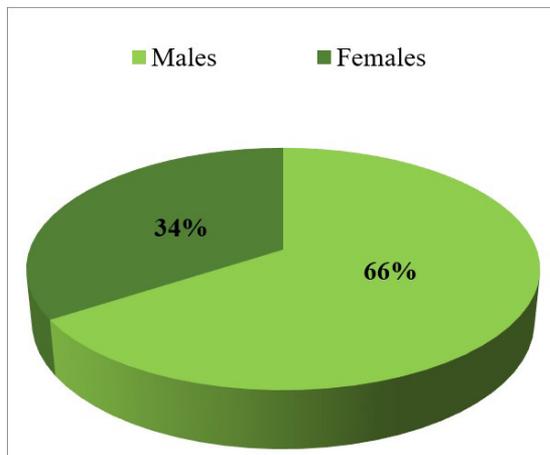
Among positive cases, the most prevalent specie was *Entamoeba histolytica*, which was (48%) followed by *Hymenolepis nana* (26%) and *Giardia intestinalis* (17%). Other Intestinal parasites *Trichomonas hominis* (5%) and *Trichuris trichiura* (5%) were also found (Table 2).

Children with age less than 10 yrs were highly infected with intestinal parasitic infections with the Infection rate of 33% (Table 3), while children between 11-20 yrs were the second largest group (29%) infected with Intestinal parasitic infections. Table 4 shows varying symptoms of Intestinal Parasitic Infections in different people and their percentage. 90% of the patients had abdominal pain and discomfort. Diarrhea was also a major symptom among patients with an occurrence of 71%. 52% of the patients also had a complaint about stomach pain, 81% of the patients said that they were feeling tired. Some other symptoms were also prevalent in patients including constipation (10%), nausea or vomiting (10%) gas or bloating (43%), Dysentery (33%), rash or itching around rectum (43%), weight loss (14%), and weight gain (10%).

Study revealed that 62% of patients were not having hand washing habit before eating. 81% of the patients used untreated water (Table 5). Educational status of 48% patients was primary or below primary. Maximum positive

Table 1. Gender effectiveness on the Prevalence of Intestinal Parasitic Infections (IPIs) in Rural and Urban areas of Quetta, Balochistan.

| Sampling Area | Sample size | Gender | N | Positive | | Total Prevalence (%) |
|---------------|-------------|--------|-----|----------|----------------|----------------------|
| | | | | N | Prevalence (%) | |
| Rural areas | 124 | Male | 62 | 19 | 30% | 23% |
| | | Female | 62 | 9 | 14% | |
| Urban areas | 80 | Male | 40 | 9 | 22% | 17% |
| | | Female | 40 | 5 | 12% | |
| Total | 204 | | 204 | 42 | 21% | |

**Figure 1.** Percentage (%) of total prevalence in male and female patients in urban and rural areas of Quetta.

cases were having lower socio economic status that was 52%, while least prevalence was found in patients with higher socio-economic status that is only 14%. Majority of the patients prevalent with IPS was using open sanitary system (71%).

4. Discussion

Many prevalent studies have been highlighted that Intestinal Parasitic infections (IPIs) are serious health burden nationally and internationally. In the prevailing study, the overall prevalence of Intestinal parasitic infections was 21%, which was in agreement with Chaudhry et al. (2004) as 29% and Mbae et al. (2013) as 26%, but the rate of prevalence was comparatively lower than study of Mehraj et al. (2008) from Karachi, Pakistan who obtained 53% prevalence and Mumtaz et al. (2009), who observed 68.8% prevalence in children under five years age at a tertiary care hospital in Karachi.

The study revealed that Intestinal Parasitic Infections are more prevalent in Males (66%) and was comparatively less prevalent in females (34%). This may be because males have the higher risk of contacting to outer environment due to their jobs in Balochistan. Jasti et al. (2007) also reported higher proportion of males (29%) than females.

Table 2. Percentage (%) of individual parasitic species in positive patients.

| Parasites | No. of positive cases | Percentage (%) |
|-----------------------------|-----------------------|----------------|
| <i>Entamoebahistolytica</i> | 20 | 48% |
| <i>Hymenolepis nana</i> | 11 | 26% |
| <i>Giardia Intestinalis</i> | 7 | 17% |
| <i>Trichomonashominis</i> | 2 | 5% |
| <i>Trichuristrichiura</i> | 2 | 5% |
| Total | 42 | 100% |

Table 3. Percentage of intestinal parasitic infections among different age group.

| Age group (yr) | Patients | | Positive | |
|----------------|----------|----------------|----------|----------------|
| | N | Percentage (%) | N | Percentage (%) |
| 1-10 | 48 | 24% | 16 | 33% |
| 11-20 | 70 | 34% | 20 | 29% |
| 21-30 | 59 | 29% | 4 | 7% |
| >30 | 27 | 13% | 2 | 7% |

Table 4. The percentage of signs and symptoms acquired by the patients of intestinal parasitic infections.

| Variable | Percentage (%) |
|--|----------------|
| Abdominal pain | 90% |
| Diarrhea | 71% |
| Constipation | 10% |
| Nausea or vomiting | 10% |
| Gas or bloating | 43% |
| Dysentery | 33% |
| Rash or itching around rectum or vulva | 43% |
| Stomach pain or tenderness | 52% |
| Exhaustion | 81% |
| Weight loss | 14% |
| Weight gain | 10% |

Table 5. Impact of different variables on IPIs and their percentages.

| Variables | Percentage (%) |
|-------------------------------|----------------|
| Hand washing habits | |
| Yes | 38% |
| No | 62% |
| Type of Drinking water | |
| Treated | 19% |
| Untreated | 81% |
| Educational status | |
| Primary and below | 48% |
| Above primary below matric | 38% |
| Above graduation | 14% |
| Socio-economic status | |
| Lower | 52% |
| Middle | 34% |
| High | 14% |
| Sanitary system | |
| Open | 71% |
| Closed | 28% |
| Family size | |
| <5 | 33% |
| <10 | 48% |
| <15 | 19% |

In present study the prevalence of Intestinal Parasitic Infections were higher in rural areas of Quetta, Balochistan (23%) than in urban areas (17%). The main reasons of this high prevalence were poor hygienic conditions and lower educational status.

The prevailing study outlined that among Intestinal Parasites the most prevalent was *Entamoeba histolytica* (48%). Studies suggest that *Entamoeba histolytica* are transmitted by feces. If contaminated water or food is ingested, it causes amoebiasis. In Quetta, agricultural products are grown with the help of sewage water that increase the risk of ingesting the parasite. The other prevailing parasites were *Hymenolepis nana* (26%), *Giardia Intestinalis* (17%), *Trichomonas hominis* (5%) and *Trichuris trichiura* (5%). Similar study was conducted by Mumtaz et al., (2009), which also indicated higher prevalence of *Entamoeba histolytica* followed by *Hymenolepis nana* and *Giardia intestinalis*. Some other intestinal parasites were also found in their study like *Taenia saginata*. However this parasite was absent in our study.

Study revealed that Intestinal Parasitic Infections (IPIs) were highly prevalent in children among age group 1-10 years. Similar result was noted by Kiani et al. (2016), in western Iran. This may be a result of poor hygiene in children.

The following study indicated several signs and symptoms acquired by IPIs patients. The highest percentage was of abdominal pain followed by diarrhea, tiredness,

rash or itching around rectum, dysentery, gas or bloating etc (Kiani et al., 2016).

Educational status and awareness about hygiene play an important role in the transfer of Intestinal Parasitic Infections. Our study revealed that higher the education level lower was the risk of acquiring Intestinal Parasitic infections. Several studies from outside Pakistan (Wamani et al., 2004; Mehraj et al., 2008) and some international studies (Quihui et al., 2006; Chaudhry et al., 2004) also revealed same results.

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