Prevalence of intestinal parasites in Lorestan Province, West of Iran

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ARTICLE INFO

Article history:
Received 1 Jul 2014
Received in revised form 24 Jul 2014
Accepted 28 Jul 2014
Available online 8 Aug 2014

Keywords:
Intestinal parasite
Protozoan
Helminthes
Lorestan

ABSTRACT

Objective: To study the prevalence of intestinal parasites in Lorestan Province, West of Iran.

Methods: This cross-sectional study was conducted on 2838 stool samples in Khorramabad, Lorestan Province in 2013. Samples were examined by the several techniques.

Results: The frequency of intestinal parasites was 465 (16.4%) of which 188 (13.5%) samples were for urban areas and 277 (19.2%) for rural areas. Infection in rural areas was significantly higher than urban areas. Out of 465 infected samples, 456 (98%) were contaminated with protozoan parasites and 9 (2%) with helminthes. Infection in people who sometimes used the soap to wash hands was significantly more than those who always used soap (P<0.001). Infection in people with poor economic conditions was significantly more than the two groups with moderate and good economic conditions (P<0.001).

Conclusions: Effective reasons for the reducing incidence of intestinal parasites in Lorestan Province could be the development of universities with more students led to increased awareness, improvement of the environment, increase of the ease of access to health care centers, increase of advertising in provincial mass media about health training, increased health culture, and dispose of sanitary waste properly.

1. Introduction

One of the most common infections in the world is intestinal parasites since about one-third of people has these infections which causes numerous symptoms especially in young children[1]. Despite the effort and extensive programing of the World Health Organization, the prevalence of intestinal parasites has caused economic, social and health losses[2]. The prevalence of these parasites in different regions is different as environmental, economic, regional, political and cultural habits and social factors have a significant role in their prevalence[3,4]. For example, lack of access to clean water, poor sanitation, economic poverty, high population density, living in the tropics and unexpected events such as earthquakes and floods can increase the risk of parasitic infection[5].

Parasitic infections in patients especially children are associated with poor growth, physical weakness and loss of academic progress[4,6]. It is believed that improving living conditions could be effective in reducing the prevalence of parasites[4]. Zoonotic parasites stored in the animals as reservoir host. Special attention should be paid on these hosts to control parasites[7]. Collecting the epidemiological data, such as the prevalence of intestinal parasitic infections in different regions, is a useful prerequisite for planning and controlling of parasitic infections[8]. Iran is located in the south of Caspian Sea, west of Afghanistan, the east of Iraq and north of Persian Gulf. The weather in north and south of Iran is temperate and subtropical, respectively.

The prevalence of parasites in this country is diversity because of various weather conditions, diversity of cultures
and traditions in different regions of Iran[9]. The purpose of this study was to investigate the prevalence of intestinal parasites in Lorestan Province, Iran.

2. Materials and methods

2.1. Study area

This study was carried out in Khorramabad City, Lorestan Province, West of Iran, located between latitudes 32° 30' and 48° 1' N and longitudes 55° 17' and 61° 15' E. Long-term annual mean temperature and precipitation are 17.07 °C and 580 mm, respectively. The weather and climate of Lorestan Province have a variation. This province is classified as a region with a semi-arid climatic condition. The total area of the province is 28,064 km² and the total cultivated area of barley is about 138,978 ha consisting of 9,029 ha of irrigated and 129,949 ha dry land barley[10].

Lorestan Province has a total population of 1,754,243, including 883,693 males and 870,550 females. About 1,075,951 people, including 536,589 males and 539,362 females, live in urban areas and 677,416 people, including 346,653 males and 330,763 females, live in rural areas[11].

2.2. Feces collection and analysis

This cross-sectional study was conducted in 2013. Samples were collected using multi-stage random cluster sampling. The trained people were chosen for the completion of the questionnaires and collection of the samples. Stool samples were collected in stool container and transported to the laboratory of parasitology.

Samples were examined by the techniques including direct wet-mount, Lugol’s iodine staining, formaldehyde–ether sedimentation, agar culture and Trichrome staining.

2.3. Statistical analysis

Results were statically examined by using SPSS software, version 17. Chi–square test at the 5% level was used to assess the relation between the prevalence of intestinal parasites and qualitative variables. Differences were considered significant when $P$ value was less than 0.05.

3. Results

The frequency of intestinal parasites in 2,838 stool samples was 465 (16.4%) of which 188 (13.5%) samples were for urban areas and 277 (19.2%) for rural areas.

Infection in rural areas was significantly higher than urban areas ($P<0.001$).

The results showed that contamination with pathogenic and non-pathogenic parasites were 203 (43.6%) and 262 (56.4%), respectively.

The prevalence of intestinal parasites in cities studied of Lorestan Province, Iran is reported in Table 1 in details.

### Table 1

| City          | Parasite                  | No. of parasites detected [n, %] | Total number of tests | Frequency of positive cases [n, %] |
|---------------|---------------------------|---------------------------------|-----------------------|----------------------------------|
| Alehtar       | B. hominis                | 3 (1.80%)                       | 167                   | 25 (15.0%)                       |
|               | I. butschlii              | 2 (1.20%)                       |                       |                                  |
|               | G. lamblia                | 10 (0.60%)                      |                       |                                  |
|               | E. coli                   | 8 (4.80%)                       |                       |                                  |
|               | Trichomonas hominis       | 1 (0.60%)                       |                       |                                  |
|               | Trichuris trichiura       | 1 (0.60%)                       |                       |                                  |
| Aligudarz     | B. hominis                | 6 (2.50%)                       | 265                   | 61 (23.0%)                       |
|               | I. butschlii              | 3 (1.20%)                       |                       |                                  |
|               | E. coli                   | 20 (7.70%)                      |                       |                                  |
|               | G. lamblia                | 23 (8.80%)                      |                       |                                  |
|               | E. nana                   | 3 (1.00%)                       |                       |                                  |
|               | Chilomastix mensaI        | 2 (0.80%)                       |                       |                                  |
|               | E. histolytica/E. dispar  | 2 (0.80%)                       |                       |                                  |
| Arzua         | G. lamblia                | 7 (3.00%)                       | 173                   | 7 (4.0%)                         |
| Brengerd      | B. hominis                | 110 (19.00%)                    | 582                   | 161 (27.7%)                      |
|               | I. butschlii              | 15 (2.60%)                      |                       |                                  |
|               | E. coli                   | 15 (2.60%)                      |                       |                                  |
|               | G. lamblia                | 16 (2.70%)                      |                       |                                  |
|               | E. nana                   | 2 (0.34%)                       |                       |                                  |
|               | H. nana                   | 2 (0.34%)                       |                       |                                  |
|               | E. histolytica/E. dispar  | 1 (0.17%)                       |                       |                                  |
| Doroud        | B. hominis                | 3 (1.20%)                       | 241                   | 27 (11.0%)                       |
|               | I. butschlii              | 2 (0.80%)                       |                       |                                  |
|               | E. coli                   | 4 (1.70%)                       |                       |                                  |
|               | G. lamblia                | 14 (5.80%)                      |                       |                                  |
|               | Enterobius vermicularis   | 1 (0.40%)                       |                       |                                  |
|               | H. nana                   | 2 (0.80%)                       |                       |                                  |
|               | E. histolytica/E. dispar  | 1 (0.40%)                       |                       |                                  |
| Khorramabad   | E. coli                   | 12 (2.20%)                      | 555                   | 52 (9.7%)                        |
|               | G. lamblia                | 20 (3.70%)                      |                       |                                  |
|               | E. histolytica/E. dispar  | 1 (0.20%)                       |                       |                                  |
|               | Strongylodes stercoralis  | 2 (0.35%)                       |                       |                                  |
|               | H. nana                   | 2 (0.35%)                       |                       |                                  |
|               | I. butschlii              | 3 (0.40%)                       |                       |                                  |
|               | Trichomonas hominis       | 1 (0.20%)                       |                       |                                  |
|               | E. nana                   | 1 (0.20%)                       |                       |                                  |
| Kouhdasht     | G. lamblia                | 12 (4.00%)                      | 303                   | 13 (4.3%)                        |
|               | B. hominis                | 12 (3.90%)                      |                       |                                  |
| Nourabad      | G. lamblia                | 16 (5.00%)                      | 154                   | 27 (17.5%)                       |
|               | Chilomastix mensaI        | 5 (1.50%)                       |                       |                                  |
|               | E. histolytica/E. dispar  | 6 (1.90%)                       |                       |                                  |
| Pulskhtar     | G. lamblia                | 40 (7.00%)                      | 103                   | 56 (25.4%)                       |
|               | E. histolytica/E. dispar  | 7 (1.30%)                       |                       |                                  |
|               | E. coli                   | 2 (0.40%)                       |                       |                                  |
| Sajd dasht    | B. hominis                | 6 (1.80%)                       | 96                    | 29 (30.2%)                       |
|               | I. butschlii              | 1 (0.30%)                       |                       |                                  |
|               | E. coli                   | 2 (0.60%)                       |                       |                                  |
|               | G. lamblia                | 18 (5.80%)                      |                       |                                  |
|               | E. nana                   | 1 (0.30%)                       |                       |                                  |
|               | E. histolytica/E. dispar  | 1 (0.30%)                       |                       |                                  |

B. hominis; Blastocystis hominis; I. butschlii; Iodamoeba butschlii; G. lamblia; Giardia lamblia; E. coli; Entamoeba coli; E. nana; Entamoeba histolytica; E. histolytica; H. nana; Hymenolepis nana.
Out of 465 infected samples, 456 (98%) were contaminated with protozoan parasites and 9 (2%) with helminthes (Table 2). Also, 432 (15.2%) samples were infected with one parasite and 33 (1.2%) with more than one parasite.

| Variable | No. of samples | Frequency of contamination [% (n)] | P value |
|----------|----------------|-----------------------------------|---------|
| Gender   |                |                                   |         |
| Male     | 1197           | 188(15.7%)                        | 0.37    |
| Female   | 1564           | 245(16.2%)                        |         |
| Level of education |           |                                   |         |
| Low literate | 1864      | 338(18.1%)                        | 0.01    |
| Diploma  | 441            | 57(12.9%)                         |         |
| Academic degree |          | 145                               | 18(12.4%)|         |
| Age group (years) |      |                                   |         |
| <10     | 578            | 82(14.2%)                         | 0.17    |
| 10–19   | 584            | 118(20.2%)                        |         |
| 20–29   | 478            | 78(16.3%)                         |         |
| 30–39   | 445            | 70(15.7%)                         |         |
| 40–49   | 301            | 46(15.3%)                         |         |
| 50–59   | 204            | 33(16.2%)                         |         |
| ≥60     | 172            | 25(14.5%)                         |         |
| Use of soap |            |                                   |         |
| Sometimes | 917         | 19(21%)                            | <0.001  |
| Always   | 1824           | 254(13.9%)                        |         |
| Wash the vegetables and lotions | |                                   |         |
| Leading detergent | 82       | 10(12.2%)                          | 0.19    |
| Always   | 1824           | 254(13.9%)                        |         |
| Location |                |                                   |         |
| Urban    | 1394           | 188(13.5%)                        | <0.001  |
| Rural    | 1444           | 277(19.2%)                        |         |
| Economic situation |        |                                   |         |
| Well     | 128            | 16(12.5%)                         |         |
| Average  | 911            | 117(12.8%)                        | <0.001  |
| Poor     | 1352           | 250(18.5%)                        |         |

There were 188 (15.7%) samples for men and 254 (16.2%) for women that significantly different between the sexes was not observed (P>0.05) (Table 2).

Infection in people who sometimes used the soap to wash hands was significantly more than those who always used soap (P<0.001) (Table 2).

Infection in people with poor economic conditions, was significantly more than the two groups with moderate and good economic conditions (P<0.001) (Table 2).

The relationship between intestinal parasites and how to wash vegetables, showed no significant (P>0.05) (Table 2).

Despite the frequency of intestinal parasites in different age groups did not differ significantly, in age group 10–19 years, the highest rate of infection was observed (P>0.05) (Table 2).

4. Discussion

One of the most common infections in the world is intestinal parasites. About 3.5 billion people are affected in the world of which 450 million infected people, mostly children, suffer the effect of these contaminants. Infection with this parasite may be associated with symptoms such as intestinal disorders, anemia, malabsorption, growth failure in children and physical psychological problems, therefore, it was seen as the main health problem[12].

In this study, the prevalence of intestinal parasites was reported 16.4% that in comparison with the results of studies conducted in recent decades in other Provinces of Iran, and even in some countries are less[2,5,12–38].

The result of the present study was similar to results of previous studies in Lorestan Province in which the prevalence of intestinal parasites was reported low[30–41].

A number of similar studies results in other countries show that the frequency of intestinal parasites than it in previous decades, has been significantly reduced which proposed reasons for this reduction[16,31,35,38].

In Iran, due to the significant improvement in the level of public health because of modern agricultural development, improved household economy as well as public health sanitation, the incidence of transmission of parasitic diseases and their prevalence is declining than the past[6,28].

A total of 98% of parasites reported in this study were protozoa that were significantly more than helminthes (P<0.05). This study is consistent with a number of studies that have reported the frequency of helminthes were more protozoa[38]. Higher rate of intestinal protozoa infections is due to such direct transfer, reproduce simple, simple life cycle, resistance of protozoan cysts and healthy carriers[28].

The most common intestinal parasite in this study was G. lamblia, despite its decline in the past, was still at the head of intestinal parasitic infections[39,40]. Almost all children up to age 3 in tropical areas with poor hygiene level were infected once[41].

In this study, the second most common protozoan was B. hominis. Although this frequency is lower than results in some studies[42], but similar to the reported prevalence in previous studies conducted in Lorestan Province[43]. Since some researchers believe that this parasite is pathogenic, but in most cases it is not treated, so we should be more hesitant to deal with this parasite[44].

In present study, the prevalence of intestinal parasites in groups with poor economic conditions was significantly more. This result is more consistent with the similar studies which have suggested that the prevalence of the parasite in impoverished areas with high population density is higher[51].

In this study, out of 465 infected samples, 262 (56.4%) samples were infected with nonpathogenic intestinal parasites. Although these parasites have no role in causing
infectious diseases, the observance of them is due to fecal – oral transition which is an indicator for measurement of health status in area.

The results of this study are consistent with the results of the study that showed the prevalence of intestinal parasites in rural areas is more[28].

Effective reasons for the reducing incidence of intestinal parasites in Lorestan Province could be the development of universities with more students led to increased awareness, improvement of the environment, increase of the ease of access to health care centers, increase of advertising in provincial mass media about health training, increased health culture, dispose of sanitary waste properly. These reasons are similar to the obtained results in a number of studies conducted in Iran[16,31,37,38].

According to the results, it is recommended to learn more about the distribution of parasites, and epidemiological studies in other Iranian Provinces that each has its own unique weather conditions should be done. Finally, under the supervision of the Ministry of Health and collaboration with the Medical Universities, the necessary measures to prevent, control and minimize parasitic infections take place.

Conflict of interest statement

The authors declare that there is no conflict of interests.

Acknowledgements

The authors appreciate respected vice–chancellor and colleagues of Research and Technology, Lorestan University of Medical Sciences for their sincere cooperation. Also, of all the people who helped us in this research comes to appreciate. The authors thank Motamed for their cooperation and collecting the data during the study. This study was supported financially by grant of Lorestan University of Medical Sciences, Khorramabad, Iran.

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