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آموزش مهارت های کاربردی در تدوین و چاپ مقاله
Enteric Protozoan Parasites in Rural Areas of Bandar-Abbas, Southern Iran: Comparison of Past and Present Situation

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Abstract
Background: The main goal was to address the prevalence of enteric protozoan parasites in rural areas of Bandar-Abbas, southern Iran and to compare the results with the only conducted study in 1978.
Methods: This descriptive study was performed from 2009 through 2010 on the 565 fecal samples. Formalin-ether concentration technique was performed and the analysis was carried out using Chi-square test in SPSS software version 13.5. Finally, the comparison of our results with the only previous study which was accomplished by Sheiban and Rezaeian in 1978 was done.
Results: The overall prevalence of the protozoan parasites was 48.8%. However, the prevalence of pathogen parasites was 23%. Previous research in 1978 showed 80.4% infectivity. The most protozoan parasites were Blastocystis hominis (25.53%), Giardia lamblia (17.2%) and Entamoeba coli (15.95%). Previous study in 1978 found Entamoeba coli as the most common protozoa. Our finding revealed that the rate of single infectivity was much higher compared to previous research. The most frequency of infection was in children.
Conclusion: The remarkable decrease of protozoan parasites is mainly due to progress in health care in the villages; however more effort should be done with the goal of eradicating infectious agents.

Keywords: Enteric protozoan parasites, Prevalence, Iran

Introduction
Water- food borne gastrointestinal infections are considered as a major public health burden worldwide (1, 2). Intestinal protozoan parasites are a major group leading to gastrointestinal infections especially in tropical and subtropical areas (3). There are about 3.5 billion infected people by protozoa and/or helminthes in the world (4) as well as 58 million children suffer from these infections every year (5). Symptoms associated with enteric protozoa include non specific symptoms such as diarrhea, abdominal pain, nausea, vomiting, lack of appetite, weight loss and abdominal distension (5, 6). These infections can be life-threatening in immunocompromised patients and malnourished individuals (5). Although some intestinal parasites such as Giardia lamblia remain as a health problem in developed and developing countries (7) but in the most industrialized countries, there is a decrease in the frequency of parasites by improving health status and standardized control programs (8). Indeed, poor hygienic conditions in developing countries account for the most parasitic infections (8). Climate, poor socioeconomic statues, life style of inhabitants and human behavior are among the other important factors, which can affect the incidence of parasitic infections in these regions (8-10).

Most prevalent locations for occurrence of intestinal parasitic infections are the tropical and sub-tropical areas including rural zones of southern part of Iran (10-12). Main reasons are socio-economic status, geographic factors (6, 13), poverty, lack of sanitation, lack of healthy toilet training, inadequate personal hygiene and lack of water filtration. A previous national research in Iran (2005) revealed that the preva-
Chi-square test in SPSS software version 13.5, with a probability (P) value of <0.05. Finally, the comparison of our results with the only previous study which was accomplished by Sheiban and Rezaeian in 1978 was done (11).

Results
This study was performed in four villages of Bandar-abbas: Takht, Goduo, Gishan and Chahestan. The samples were collected randomly from 565 inhabitants of the mentioned villages, 72 cases (12.7%) had clinical manifestations such as fever, dyspepsia, abdominal pain, diarrhea and vomiting that 38(52.7%) of these cases were infected with protozoan parasites. From 493 people who were without any clinical manifestations, there were 240 (48.7%) infected cases. Out of the 565 samples, 240 were from female and 325 were from male. Of these, 102 female (42.5%) and 174 male (53.5%) were infected with at least one protozoan parasite. Prevalence of G. lamblia was 21% in men and 11.6% in women. In addition, 5.5% of men and 6.2% of women had E. histolytica/dispar.

The overall prevalence of the protozoan parasites was calculated as 48.8%. The protozoan parasites were B. hominis (25.53%), G. lamblia (17.2%), and E. coli (15.95%). Overall, 110 infected cases (39.9%) in Takht, 42 infected cases (15.2%) in Goduo, 49 infected cases (17.8%) in Gishan and 75 infected cases (27.2%) in Chahestan were detected.
Table 1: Prevalence of intestinal protozoan parasites in different age groups in four villages of Bandar Abbas in 1978 and 2009

<table>
<thead>
<tr>
<th>Range of age (year)</th>
<th>E. histolytica/dispar (%)</th>
<th>G. lamblia (%)</th>
<th>E. coli (%)</th>
<th>Blastocystis (%)</th>
<th>I. butschlii (%)</th>
<th>C. mesnili (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-5</td>
<td>26.5</td>
<td>0</td>
<td>48.9</td>
<td>21.4</td>
<td>44.8</td>
<td>7.1</td>
</tr>
<tr>
<td>6-10</td>
<td>28.2</td>
<td>4.5</td>
<td>28.2</td>
<td>34.1</td>
<td>55.7</td>
<td>20.5</td>
</tr>
<tr>
<td>11-15</td>
<td>28.1</td>
<td>9.8</td>
<td>27.6</td>
<td>13.1</td>
<td>57.7</td>
<td>29.5</td>
</tr>
<tr>
<td>16-20</td>
<td>39.5</td>
<td>0</td>
<td>25.5</td>
<td>0</td>
<td>60.4</td>
<td>5.6</td>
</tr>
<tr>
<td>21-40</td>
<td>42.5</td>
<td>6.2</td>
<td>30.3</td>
<td>15.4</td>
<td>61.9</td>
<td>0</td>
</tr>
<tr>
<td>≥41</td>
<td>57</td>
<td>5.3</td>
<td>17.5</td>
<td>5.3</td>
<td>75.1</td>
<td>5.3</td>
</tr>
<tr>
<td>Total</td>
<td>34.6</td>
<td>5.8</td>
<td>28.6</td>
<td>17.2</td>
<td>59.5</td>
<td>15.9</td>
</tr>
</tbody>
</table>

Not Reported

Endolimax nana and Trichomonas hominis have not detected in the present study.

Table 2: Comparison of single and multiple intestinal protozoan infections in four villages of Bandar-Abbas in 1978 and 2009

<table>
<thead>
<tr>
<th>Locality</th>
<th>Total</th>
<th>Single</th>
<th>Infection (%)</th>
<th>Multiple</th>
</tr>
</thead>
<tbody>
<tr>
<td>Takht</td>
<td>39.8</td>
<td>78.2</td>
<td>51.8</td>
<td>32.6</td>
</tr>
<tr>
<td>Goduo</td>
<td>15.2</td>
<td>81.0</td>
<td>73.8</td>
<td>20.3</td>
</tr>
<tr>
<td>Gishan</td>
<td>17.8</td>
<td>87.8</td>
<td>59.2</td>
<td>50.8</td>
</tr>
<tr>
<td>Chahestan</td>
<td>27.2</td>
<td>79.1</td>
<td>50</td>
<td>37.0</td>
</tr>
<tr>
<td>Total</td>
<td>48.8</td>
<td>80.4</td>
<td>55.9</td>
<td>35.1</td>
</tr>
</tbody>
</table>

Fig. 1: The map of Bandar-abbas and the villages

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Discussion
In the present study 48.8% of people from rural areas of Bandar-Abbas were infected with at least one enteric protozoan parasite. As we expected, there was a clear decrease in the frequency of the intestinal protozoa in these regions compared to the previous research by Sheiban and Rezaeian, who found 80.4% infectivity with protozoan parasites (11). It is worth mentioning that although prevalence has decreased compared to past, 48.8% prevalence reflects a high frequency of parasites in the region indicating a clear need for more sanitary facilities. Of course the frequency of pathogen genera was about 23%. It is interesting that the present study showed a change in the pattern of the protozoan genera compared to the previous study (11). In the previous study the most common protozoa was E. coli (59.5%), E. histolytica/dispar (34.6%) and G. lamblia (28.6%) (11). Our study confirmed that the most prevalent protozoan was B. hominis compared to 1978 when E. coli was detected as the most common protozoan parasite (11). It should be noted that B. hominis was not reported in 1978 and therefore there is a possibility that this protozoa was also common at that time (Table 1). Besides, the prevalence of all kind of parasites has decreased significantly, for example, prevalence of E. histolytica/dispar in Takht changed from 28.4% (11) to 6.38%. Also, in the previous study, there was a high frequency of E. histolytica/dispar in Chahestan and G. lamblia had the highest frequency in Gishan, but in our study B. hominis had the highest frequency in all villages followed by G. lamblia and E. coli respectively. The prevalence of different protozoan parasites in 1978 and 2009 are shown in Fig. 2.

In previous study, the percentage of single and multiple infections was 32.85% and 63.14%, respectively (11). The difference of percentage of single and multiple infections in 1978 and 2009 was shown in Table 2.

In our study, there was a significant difference between gender and prevalence of disease (P=...
0.00). This finding was similar to the previous study of (11).

Although the results of our study showed B. hominis and G. lamblia as the most common parasites, but E.coli also had a high frequency in these regions which followed results of other studies in the other parts of country (12, 14, 16). This is important to note that human behavior, customs and life style of the inhabitants can directly affect the infectious agents of these regions (17). One important explanation regarding the obvious decrease between our result and previous findings in 1978 is the recent progresses in socioeconomic statues in these regions. Three decades ago, the inhabitants of rural area in Bandar-Abbes used to be nomadic without adequate services. Simple transmission rout (oral- fecal) of enteric protozoan parasites coupled with usage of unfiltered water (9) as well as low literacy of inhabitants were all responsible for the high rate of infections in the past 30 yr (11). The findings of Hooshyar et al. suggested that the cyst viability is longer in the tropical zones (10). There are several studies regarding prevalence of intestinal parasites in different regions of Iran which all revealed that G. lamblia is one of the most common parasites (8, 11, 12, 14, 18). However, there was only one study in rural area of Bandar Abbas (11). A previous study in north of Iran showed prevalence of parasites in apparently healthy people was as follows: Trichostrongylus sp. 6.4%, G. lamblia 3.8%, Cryptosporidium sp. 2.5%, E. coli 2.5%, E. histolytica 1.2% (18). In another study that has been done on 3825 stool specimen from north, south and centre of Iran, E. histolytica was detected in only 1.52% of collected stool samples in microscopically examination which 3.45% of them was E. histolytica by PCR (19). Although in previous studies E. histolytica was one of important and common parasites (8, 14, 15), but according to the present studies we can conclude E. histolytica/dispar has a less important role in protozoan intestinal disease (6, 12-14).

In conclusion, in the past 30 yr, there have been no studies in villages of Bandar Abbas and therefore the present study has been the second one in the region. Epidemiological research conducted regularly is necessary for control and preventive strategy programs. Although the present study showed, a decrease in total prevalence of enteric protozoan parasites but 48.8% prevalence and 23% prevalence of pathogen parasites is still high and there is a clear need for more progress. Inhabitants are in need of more guidance regarding personal and social sanitary precautions. The remarkable decrease of protozoan parasites is mainly due to progress in health care in the villages; however more effort should be done with the goal of eradicating infectious agents.

**Ethical Considerations**

Ethical issues including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc. have been completely observed by the authors.

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**References**


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