PREVALENCE OF PARASITIC CONTAMINATION OF RAW VEGETABLES IN AHAR, IRAN

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ABSTRACT:
It is well known that foodborne infections can be transmitted to humans via vegetable consumption. The study reported here aimed to determine the prevalence of parasitic contamination on raw vegetables sourced from market region of the Ahar city of Iran. The vegetables examined in this work included lettuce, carrots, spinach, tomatoes, parsley, green pepper, leek and radish. For each vegetable type, 10 samples were collected and resulting in 80 samples used in subsequent analysis. These samples were analyzed by a concentration method and examined by light microscopy. Intestinal parasites were detected in 30% of the examined samples. The parasites included Ascaris lumbricoides eggs, Hymenolepis nana eggs, Giardia spp. cysts, Cryptosporidium spp. oocysts, Entamoeba coli spp. Entamoeba histolyca spp. The contamination of vegetables with infective ova emphasizes the need for adequate preventative measures that can assist in avoiding the transmission of diseases.

Keywords: Intestinal parasites, Iran, Vegetable contamination.

INTRODUCTION
Intestinal parasitic infections are widely distributed throughout the world causing substantial intimidation to the public health, economy, and physical and cognitive development particularly among children in developing countries like Iran(1). Vegetables are essential part of a healthy human diet owing to their nutritional value (2). Vegetables are a very important source of various nutrients, including fiber, vitamins and minerals (3). Some vegetables are eaten raw as salad to retain the natural taste and preserve heat labile nutrients (4). Ingestion of raw
vegetables represented an important means of transmission of several infectious diseases because of their complex surface and porosity, which unfortunately facilitate pathogen attachment and survival (5). In addition, it is known that, in developing countries and water-poor regions, the use of water-containing effluents, or those contaminated with human feces, for irrigation of crops can increase the rates of contamination with infective parasites(6). The consumption of raw vegetables without proper washing is an important route in the transmission of parasitic diseases (7). There has been an increase in the number of reported cases of food-borne illness linked to fresh vegetables (8). In recent years, there has been an increasing in number of reported cases of food-borne illnesses linked to consuming of fresh vegetables (9, 10). The consumption of raw vegetables plays a major epidemiological role in the transmission of parasitic food-borne diseases (11, 12). Intestinal parasites are widely prevented in developing countries, probably due to poor sanitation and inadequate personal hygiene (13). Up to our knowledge, there are limited studies on the possible contamination of freshly eaten vegetables in Iran and referring to existing scientific literature, no previous surveys have been conducted to evaluate the presence of parasitic contamination in vegetables in Ahar. Therefore, this study was designed to detect the parasitic contamination in some common green vegetables used for raw consumption in Ahar, Iran.

MATERIALS AND METHODS:
Eight types of vegetables including lettuce, parsley, carrot, tomato, green pepper, leek, spinach, and radish were purchased from conveniently selected local market Ahar city. Equal numbers of samples (10 each, totally 80 samples) were collected from the selected market. The samples were collected, put in plastic bags, properly labeled, and brought to the Medical Parasitology Laboratory of Tabriz University for parasitological analysis. First, 200 g of each specimen was randomly obtained from each sample and then submerged in 1.5 L of a 1% (w/v) sodium dodecyl sulfate and 1% (v/v) tween 80 (Sigma-aldrich Chemie GmbH, Steinheim, Germany). Next, the sample was sonicated for 10 minutes, after which, 50 mL aliquots from the miscible were centrifuged for 15 minutes at 1500 g. The resulting sediments were examined microscopically at 10× and 40× magnifications using a light microscope.

RESULTS:
The results of the study showed that 24 samples were identified to be contaminated with at least one type of parasite, which gave rise to the overall contamination rate of 30%. These include 60% of lettuce, 40% of parsley, 10% of tomato, 60% of leek, 30% of spinach, 40% of radish (Table 1). A total of 16 protozoans and 8 helminths were found to be associated with the various vegetables and include, ova of Ascaris lumbricoides, Hymenolepis nana, oocysts of Cryptosporidium spp, and cysts of Giardia lamblia, Entamoeba coli and Entamoeba histolytica.

<table>
<thead>
<tr>
<th>Vegetables</th>
<th>A. lumbricoides</th>
<th>H. nana</th>
<th>Cryptosporidium</th>
<th>G. lamblia</th>
<th>E. coli</th>
<th>E. histolytica</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>lettuce</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>5 (6.25%)</td>
</tr>
<tr>
<td>parsley</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3 (3.75%)</td>
</tr>
<tr>
<td>carrot</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>tomato</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>1 (1.25%)</td>
</tr>
<tr>
<td>green pepper</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>leek</td>
<td>2</td>
<td>-</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>-</td>
<td>4 (5%)</td>
</tr>
<tr>
<td>spinach</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>3 (3.75%)</td>
</tr>
<tr>
<td>radish</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>6 (7.5%)</td>
</tr>
<tr>
<td>Total (%)</td>
<td>5 (6.25%)</td>
<td>3 (3.75%)</td>
<td>1 (1.25%)</td>
<td>8 (10%)</td>
<td>4 (5%)</td>
<td>3 (3.75%)</td>
<td>24 (30%)</td>
</tr>
</tbody>
</table>

DISCUSSION:
The consumption of raw vegetables plays an important role in the transmission of parasitic contaminations (12). Recovery of parasites from vegetables used as the source of contamination may be helpful in indicating the incidence of intestinal parasites among a community (13). This study showed a considerably high level of contamination of vegetables with intestinal parasites in Ahar. The present study has attempted to assess the level of contamination and prevalence of different intestinal parasites from vegetables in selected market of Ahar Town. The overall parasitic contamination rate was found to be 30%, which is in agreement with the findings reported elsewhere (14, 15). However, it is higher than what was reported in similar studies from other areas (16-18). On the other hand, it is lower when compared with the findings of some studies (19, 20). The discrepancy between the present study and previous studies might be as a result of the variations in geographical locations, climatic and environmental conditions, the kind of sample and sample size examined, the sampling techniques, methods used for detection of the intestinal parasites, and socioeconomic status. So long as these factors differ, consequently the discrepancy of the results would be expected. In this study, Leek (60%) and lettuce (60%) being the most contaminated vegetable. In Abha, Saudi Arabia, parasitological contamination was reported to be 13% in leek (21). In contrast, a previous study reported that 60% of leek had been contaminated with parasites in an evaluation study of the edible vegetables in Qazvin, Iran (1). Eggs of A. lumbricoides were detected in 50% of vegetables examined being the predominant pathogenic parasite in the present work. The highest contamination with this parasite was detected in Leek samples (20%). The rate of contamination with Ascaris eggs concurs with other studies in Iran. It was 2% in Ardabil, 2.5% in Jiruft and 2.3% in Qazvin (1, 22, 23). A high level of contamination of the environment with the eggs of intestinal parasites such as Ascaris spp. observed in many regions of the world is associated with the high fertility of these parasites. Multiple species contamination was observed in all kinds of produces examined in this study. This might indicate the possibility of high level contamination of the vegetables, which perhaps results in multiple parasitic infections in human. It might also indicate the persistence of intestinal parasitic infection in the area (24). The contamination rate was signicantly different for the samples collected this might be associated with the act of washing of the produces before display; 30% of the samples collected from the market were not washed.

CONCLUSION:
The survey revealed that 30% of the studied vegetable samples were contaminated with at least one of sex analyzed gastrointestinal parasites. Thus, vegetables sourced from the main vegetable market in the ahar city need to be washed, peeled or cooked to avoid infection.

REFERENCES