Prevalence of soil-transmitted helminthes in vegetables sold in Bali markets, Taraba State, Nigeria

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ABSTRACT

In Nigeria, leafy vegetables form essential part of dietary foods especially in the South-eastern part. This is because of enormous supplements derived from them that affect human health positively. These benefits derived were however reduced drastically by incidence of soil-transmitted helminthes associated ailments in humans who consumed these vegetables on daily basis. This present study was carried out to determine the prevalence of soil transmitted helminthes in vegetables sold in Bali markets. Parasitological investigation of vegetables for parasitic stages of soil transmitted helminthes was conducted using centrifugation and microscopical methods. Out of nine vegetable samples examined 55.55% were positive for helminthes eggs contamination, 4.55% in bitter leaf and hibiscus leaves, 22.73% in moringa leaves, 54.55% in okra leaves and 13.64% in clove basil. Two larvae were found in bitter leaf and three larvae were also found in pumpkin or marrow leaves. Most of the helminthes detected in the vegetables were Ascaris lumbricoides and Ancylostoma duodenale while Necator americanus were low in prevalence. No parasites were detected in samples collected from leaves of spiny amaranth and black Beniseed. The results showed that highest prevalence rate was found in okra leaves while the lowest was bitter leaf and hibiscus leaves. The distribution of these helminthes in these leafy vegetables were responsible for the prevalence of soil-transmitted helminthes associated ailments in Bali. Finally, vegetables should be properly washed with salt to deter predisposing factor for infection of soil-transmitted helminthes.


Received October 1, 2015; Accepted October 26, 2015; Published November 4, 2015.

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Competing Interests: The authors have declared that no competing interests exist.

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Keywords: Ascaris lumbricoides, vegetables, soil-transmitted, helminthes, prevalence, Bali.

1. INTRODUCTION

The word “Helminthes” is a Greek word meaning "worm”. Helminthes are multi-cellular parasite (metazoans) based on the structures; two major forms have been recognized; the Phylum Platyhelminthes and Nematyhelminthes [1]. Soil transmitted helminthes are group of parasitic worms that can cause infections in human through contact with eggs or larvae parasite itself. It is growing in moist soil contaminated in the country tropical and sub-tropical [2].

Four intestinal nematodes in particular standout because, of their wide spread and distribution which results in hundreds of millions of humans infections. These includes the large roundworms (Ascaris lumbricoides), the whipworm (Trichuris trichiura), hookworm (Necator americanus, Ancylostoma duodenale), then, threadworm (Strongyloides stercoralis) [3]. These species are collectively known as soil transmitted helminthes (STHs). Studies worldwide indicate that prevalence, intensity of soil transmitted helminthes are predominant where poverty prevails, sanitation is inadequate or non-existent and where more awareness and care is needed [4]. In consideration of the dynamics, it is estimated that soil transmitted helminthes results in 450 million illnesses worldwide [5]. Some soil transmitted risk factor are poverty and poor living condition, inadequate sanitation and water supplies, soil quality, climate, poor personal and environmental hygiene and poor awareness [6]. Soil transmitted helminthes are commonly found worldwide. It effects include anemia, vitamin A deficiency, malnutrition, loss of appetite, retard growth and reduced learning ability. Nigerian have the highest burden of this disease in Africa with over 28 million children in the country at
risk of contracting soil transmitted helminthes infections [7]. Global distribution and prevalence of soil transmitted helminthes shows that more than 1.5 billion people or 24% of the world’s population are infected with soil transmitted helminthes infection [8].

The observed prevalence endemic location in 20 states of 36 states of Nigeria, including Federal Capital Territory (FCT) Abuja ranges from 1.7 - 51.7% for hookworm, from 1.6 – 77.8% for roundworm, and 1.0 – 25.5% for whipworm [9]. Soil transmitted helminthes are considered together because, it is common for especially, children, vegetables in less developed countries to be chronically infected with the four worms (Roundworms, whipworm, hookworm, and threadworm). The World Health Organization proves that eggs that are attached to vegetables are ingested when vegetables are not carefully cooked [10]. Day land surface temperature and dense vegetation are important predators of spatial distribution of soil transmitted helminthes infection in Nigeria [11].

According to Nasa’s Imam [12] the prevalence of intestinal nematode is high in female than their male due to work done such as food preparation, fetching of water and cleaning of surroundings or farming barefooted. Ascaris has been a major intestinal nematodes infection common in areas of low age group and Bali is not an exemption. An unplanned disposal of fecal materials also contribute to re-infection of these helminthes [13].

This present study was aimed at evaluating the prevalence rate of soil transmitted helminthes on vegetables sold in Bali markets, Taraba State, Nigeria.

2. MATERIALS AND METHODS

2.1 Study Area

The study was conducted in Bali located in central zone of Taraba State, North-eastern Nigeria, about 215 Km away from Jalingo (Taraba State capital). Bali has latitude of 7.86° and longitude of 10.97° approximately. The climate of the area is tropical and vegetation characterized as guinea savannah with rainfall of about 500mm per year. The temperature ranges between 37 °C – 39 °C. There are two distinct seasons, the wet and dry seasons, the former last between June to November while the latter lasts between December to May. Farming and trading are the major occupation of inhabitants. The major occupation of the inhabitants. The majority inhabitants tribes are: Jibawa, Fulani, Ichen, Chamba and Hausa.

2.2 Sample Collection

In sampling, vegetables farmers in the study area helped to mobilize others in the same field of occupation. The aim of the study was explained to them, and they were supplied with polythene bag nine pieces of each vegetables selected for this study as shown below:

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Local Name</th>
<th>Botanical Name</th>
<th>Family</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluted Pumpkin</td>
<td>Ugu(Igbo)</td>
<td>Telfairia occidentalis</td>
<td>Cucurbitaceae</td>
</tr>
<tr>
<td>Bitter Leaf</td>
<td>Shiwaka(Hausa)</td>
<td>Vernonia amagdalina</td>
<td>Asteraceae</td>
</tr>
<tr>
<td>Clove Basil</td>
<td>Daidoya(Hausa)</td>
<td>Occimum gratissimum</td>
<td>Lamiaceae</td>
</tr>
<tr>
<td>Spiny Amaranth</td>
<td>Alayafou(Hausa)</td>
<td>Amaranthus spinosus</td>
<td>Amaranthaceae</td>
</tr>
<tr>
<td>Beniseed leaves</td>
<td>Karkashi(Hausa)</td>
<td>Sesamum indicum</td>
<td>Peddiaceae</td>
</tr>
<tr>
<td>Hibiscus Or Roselle</td>
<td>Yakwu(Hausa)</td>
<td>Hibiscus sabdarifa</td>
<td>Malvaceae</td>
</tr>
<tr>
<td>Pumpkin Or Roselle</td>
<td>Kabeewaa(Hausa)</td>
<td>Cucurbita pepo</td>
<td>Cucurbitaceae</td>
</tr>
<tr>
<td>Okra</td>
<td>Kubeewaa</td>
<td>Abelmoschus esculentus</td>
<td>Malvaceae</td>
</tr>
</tbody>
</table>

2.3 Sample of the population

A total of nine (9) samples of vegetables were collected and screened in the study area on July 24th and 25th, 2015 at Sabon-Layi and Bali main market.

2.4 Procedure for evaluating prevalence rate of soil-transmitted helminthes in vegetables

Three techniques identified for worm evaluation is vegetable microscopy.

2.4.1 Vegetable microscopy

A total of nine (9) samples unwashed vegetables. Each kind of the vegetables; fluted pumpkin leaves, clove Basil, curry leaves, leaves of black Beniseed, spiny amaranth, hibiscus or Roselle, and pumpkin were separately mixed well with 250mL of water, then washed. The water was decanted each and centrifuge at 4000rpm for 5 minutes. The sediment was placed on glass slides and examined using light microscope. The washed vegetables were subjected to helminthes egg count under the microscope using 40x objective.

2.4.2 Identification of the helminthes ova (eggs)

The findings on vegetable microscopy using compound microscope were observed. To ensure quality control, the examination was also carried out on prepared slides.
2.4.3 Statistical analysis

Data collected were analyzed using tables and charts as well as percentages.

3. RESULTS

The result of the study revealed an overall prevalence of (33.33%) of a vegetable sample examined for this parasites. Table 1, showed that okra had the highest prevalence rate of 12(54.55%) followed by moringa leaves with prevalence rate of 5 (22.73%) , while the lowest was hibiscus had 4.55% prevalence rate. Table 2, show the frequency and percentage of filiariform larvae identified in the collected vegetable samples. Pumpkin or Marrow leaves had the highest occurrence with about 3(60%) and Bitter leaf was 2 (40%). Table 3, Show the frequency distribution of the soil transmitted helminthes larvae and ova examined. The proportion of *Ascaris lumbricoides* found was 22(81.48%), hookworm was 2(7.41%) and Strongyloides 3(11.11%) while *Trichuris trichiura* was not seen.

**Table 2: Helminthes distribution based on the number of larvae**

<table>
<thead>
<tr>
<th>Vegetables</th>
<th>Scientific name</th>
<th>Common name</th>
<th>Family</th>
<th>Helminthes</th>
<th>Frequency(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Telfairia occidentalis</em></td>
<td>Fluted pumpkin</td>
<td>Cucurbitaceae</td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td><em>Vernonia amagdalina</em></td>
<td>Bitter leaf</td>
<td>Asteraceae</td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td><em>Hibiscus sabdarriffa</em></td>
<td>Hibiscus or Roselle</td>
<td>Malvaceae</td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td><em>Abelmoschus esculentus</em></td>
<td>Okra</td>
<td>Malvaceae</td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td><em>Cucurbita pepo</em></td>
<td>Pumpkin/marrow</td>
<td>Cucurbitaceae</td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td><em>Amaranthus spinosus</em></td>
<td>Spiny amaranth</td>
<td>Amaranthaceae</td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td><em>Sesamum indicum</em></td>
<td>Leaves of Beniseed</td>
<td>Peddiaceae</td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td><em>Ocimum gratissimum</em></td>
<td>Clove Basil</td>
<td>Lamiaceae</td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td><em>Moringa Oleifera</em></td>
<td>Moringa</td>
<td>Moringaceae</td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
</tbody>
</table>

* indicates no helminthes seen, ∆ highest prevalence rate.

**Table 3. Helminthes distribution based on ova**

<table>
<thead>
<tr>
<th>Vegetable</th>
<th>Scientific name</th>
<th>Common name</th>
<th>Family</th>
<th>Helminthes</th>
<th>Frequency(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Vernonia amagdalina</em></td>
<td>Bitter leaf</td>
<td>Asteraceae</td>
<td>Hookworm</td>
<td>2(40)</td>
<td></td>
</tr>
<tr>
<td><em>Cucurbita pepo</em></td>
<td>Pumpkin or marrow</td>
<td>Cucurbitaceae</td>
<td>Strongyloides</td>
<td>3(60)∆</td>
<td></td>
</tr>
</tbody>
</table>

∆ highest frequency of distribution.
4. DISCUSSION

This study has shown the potential risk of contracting helminth ova and larvae through ingestion of unwashed, raw/uncooked vegetables obtained from these farmlands. It may not be wrong to say that the hygienic status of individuals influence the infection rate in area where toilet facilities are inadequate. The contamination might have resulted from rain splashes, irrigation or river flush of contaminated soil during heavy rain-fall which deposit contaminated soil on the surface of leaves of vegetables[14]. It is also possible that the soil moisture must have favored contamination of the areas and the survival of the parasites. In each of these areas, the soil ecology was very suitable with a lot of organic matter that ensure the survival of geohelminth eggs and larvae. As long as ecological conditions are favourable in the contaminated, the larvae of hookworm and Strongyloides stercoralis remain quiescent in the moisture films of contaminated soils until contact with suitable host is made where it penetrate through the skin or remain viable on leaf surface of low growing vegetation which are common features of the study areas, human defecation could developed larvae and eggs of soil transmitted helminthes therefore, making such
environments conducive for the transmission of soil transmitted helminthes. Although parasitic infections occur globally, the majority occur in tropical regions, where there is poverty, poor sanitation and personal hygiene, often entire communities may be infected with multiple, different organisms which remain untreated because treatment is neither accessible nor affordable, effective prevention and control requires “mass intervention strategies” and intense community education. Examples include: general improved sanitation: pit latrines, fresh water wells, piped water vector control: insecticide impregnated bed nets, spraying of houses with residual insecticides, drainage, landfill. Mass screening and drug administration programmes which may need to be repeated at regular intervals.

5. CONCLUSION

Our study had shown that soil-transmitted helminthes are prevalent in okra, moringa leaves, bitter leaf, hibiscus, clove basil, and pumpkin or marrow leaves. The study also revealed that the eggs of Ascaris lumbricoides was the most prevalence among other helminthes in vegetables sold in Bali markets Taraba State, Nigeria. The present study further pinpointed that defecation are risk factor that are significantly associated with soil transmitted helminthes infection and play important role in contributing to the prevalence of soil transmitted helminthes (STHs).

It is therefore, recommended that health sectors and other concerned stakeholders should intervene and undertake adequate control measures against STHs parasites by ensuring cleanliness and sanitation facilities in vegetables farms. Health education program should also be intensified in Bali metropolis and beyond to bring awareness on soil transmitted helminthes transmission and prevention to the local populace.

ACKNOWLEDGMENTS

The authors are grateful to Bali Farmers Association and vegetables sellers for their immense cooperation in this study.

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