

A study on presence of parasites in commonly used raw herbal greens

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Abstract

Introduction: Helminthic infectivity of fresh green leafy vegetables still remains the most common public health problem. Consumption of raw and unwashed vegetables is an important means of transmission of several infectious diseases. **Aim:** The present study aimed to evaluate the presence of helminthic larvae in raw herbal greens retailed at Chennai markets. **Materials and Methods:** A total of 3 different types of raw herbal greens: roots and leaves of coriander, mint and spinach were collected and tested for parasitic larvae by saline wet mount preparation. **Results:** Strongyloides larvae were detected in 3 types of raw herbal greens: roots and leaves of coriander, mint and spinach among which coriander roots and leaves showed greater load of nematode larvae than mint and spinach. Commonly these leafy greens are consumed raw, therefore appropriate washing and proper cooking of all vegetables is very important. **Conclusion:** This study highlights the necessity of appropriate washing and cooking of green leafy vegetables before they are consumed.

Keywords: Leafy Greens, Public health, Strongyloides larvae.

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Introduction

Vegetables are essential for human health and well-being, and they form a major component of healthy diet. Joint FAO/WHO Expert Consultation on diet, has recommended the intake of a minimum of 400g of vegetables and fruits per day for the prevention of chronic diseases such as heart disease, cancer, diabetes and obesity. ⁽¹⁾

Parasitic nematodes are an important threat to public health in the world. Strongyloides affects 100-200 million in 70 countries. Strongyloidiasis is common especially in tropical and subtropical regions causing chronic infection in humans including hyperinfection syndrome causing high mortality in immunocompromised. It is ubiquitous parasite having free-living form in the moist soil which serves as a source of infective filariform larvae. ⁽²⁾

In recent years, there has been an increase in the number of reported cases of foodborne illness linked to consumption of fresh vegetables. The consumption of raw vegetables plays a major epidemiological role in the transmission of parasitic foodborne diseases. ⁽³⁾

Parasitised vegetables may occur at various stages of their production in particular through the: unsanitary conditions of field cultivation; use of fertilizers; quality of water used for irrigation and washing; storage; transportation and handling by infected individuals.⁽⁴⁾ Consumption of unwashed, raw and unhygienically prepared green leaves are considered a risk factor for human parasitic infections.

Thus, the present study was designed to detect the occurrence of *Strongyloides stercoralis* larvae in roots and leaves of coriander, mint and spinach, which poses risk of infection to humans.

Materials and Methods

This study was carried out at the Department of Microbiology, Sri Muthukumaran Medical College Hospital and Research Institute. A total of 3 different types of raw herbal greens: roots and leaves of

coriander, mint and spinach were purchased from retail markets in Chennai, during month of May 2022. Selected leafy greens were washed with physiological saline solution. The washings were collected and examined under light microscope. Roots and leaves of coriander, mint and spinach were washed and kept in beakers containing 100-120 ml of clean water and maintained for sedimentation for an hour. 50-60 ml of the sediment was filtered through a funnel using Whatman filter paper to remove coarse soil particles.

The water from the funnel was collected into centrifuge tube of 15ml capacity and centrifuged for 5-6 minutes, at 3000rpm. The supernatant was discarded, the sediment (about 1 ml) was resuspended with 1 ml of clean water, transferring a drop by pipette on to a clean glass slide and was examined under microscope with 10X and 40X respectively for the presence of Strongyloides larvae.⁽⁵⁾ 1ml of sediment containing larvae is transferred to a clean glass petriplate along with 10ml of clean water, roots and leaves of coriander, mint and spinach along with 10 micrograms of Ampicillin were added to each of these petriplates. All petriplates were closed, sealed with an adhesive cellophane tape, incubated at room temp for 24hrs and examined under microscope with 10X and 40X for larval load. ⁽⁶⁾

Results

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Figure 1: Filariform larvae of *Strongyloides*



Figure 2: Showing increased larval load

In the present study, 3 different types of fresh raw herbal greens: roots and leaves of coriander, mint and spinach were tested for helminthic larvae. *Strongyloides* larvae were detected in 3 different herbal greens, among which Coriander roots and leaves showed greater load of nematode larvae than mint and spinach. Both the developmental stages were identified in the roots and leaves of 3 leafy greens. Rhabditiform larvae were identified by their short buccal cavity. Filariform larvae with long double bulb esophagus and notched tail were identified under microscope. After 1 hour incubation, rhabditiform and a few filariform larvae were seen in 3 samples of roots and leaves. **Figure 1.** After 24 hrs incubation actively motile larvae were seen and there was a clear increase in larval load in petri plates with Ampicillin. **Figure 2.**

Discussion

In our study we recovered free-living larvae from roots and leaves of coriander, mint and spinach. Detection of *Strongyloides* larvae on raw leafy greens in the present study has significant public health implication. Vegetables may act as passive vehicles for transmission of pathogenic parasites and protozoa that are primarily transmitted through the fecal-oral route.⁽⁷⁾ Several studies over the world have shown that intestinal protozoan parasites and helminths can infect humans who consume contaminated, uncooked, or improperly washed fresh vegetables and fruits.^(8,9) Present study showed greater load of rhabditiform and filariform larvae in the root and leaves of coriander, than mint and spinach. These leafy greens are commonly consumed raw and are important components of salads. Therefore, the study points to the need for proper washing and cooking of all vegetables, particularly salad green leafy vegetables that are consumed raw. Similar results were obtained by Krishnappa et al.,⁽⁶⁾ and Muniswamappa K et al.,⁽¹⁰⁾ where they have reported the high prevalence of *Strongyloides stercoralis* in coriander leaves. This study is concordance with the findings of Hajjami, K et al, Yusof et al., Kwabena et al., who have also reported varied prevalence of *Strongyloides stercoralis*.^(11,12,13)

These results are contradictory to the report of Sunil B et al where coriander, mint and spinach were negative for parasitic larvae.⁽¹⁴⁾

Conclusion

Raw fresh herbal greens are extensively used in preparing foods, salads, chutney, and other dishes. Contaminated soil and water with night soil surely increase the possibility of soil-borne helminthic infections. These findings could lead to better practices in handling, washing, and preparation of green leaves to protect the consumers against gastrointestinal parasitic infections.

This study will help to ensure processing of herbal greens used for cooking and thus limit parasitic infections in the general population and creating awareness in the society including handling, transport, and consumption of raw vegetables.

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