

HOW SAFE ARE VEGETABLES: PARASITOLOGICAL CONTAMINATION OF FRESH LEAFY VEGETABLES IN MANGALORE

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ABSTRACT

Introduction: Parasitic diseases are the leading causes of death and disease especially in developing tropical countries like India. One of the major modes of transmission of parasites to humans is via consumption of Vegetables. They normally become a potential source by contamination, during production, collection, transport and preparation or during processing and the sources of contamination are usually faeces, faecally contaminated soil or water. **Objectives:** To know the presence of parasites fresh leafy vegetables from various wholesale and retail markets and road side vendors sellers in Mangalore. **Materials and Methods:** In a prospective study a total of 100 green leafy vegetables samples composed of green and red spinach, coriander, mint, fenugreek, drumstick leaves and casia tora were purchased from local markets and examined for the presence of parasites and results were analysed. **Results:** Out of 100 samples 42 were contaminated with parasites. Mint and red spinach showed the highest contamination of 60.86% and 53.84% respectively. Drumstick leaves and casia tora did not show any contamination. Green and red spinach were contaminated with *giardia* and *trichomonas*. **Conclusion:** Results of the present study concludes that green leafy vegetables act as a vehicle of transmission. The Mangalore cuisine being one that incorporates a high amount of the vegetables in daily meals makes the population more susceptible to parasitic infiltration.

Key Words: Green leafy vegetables, parasites, contamination.

INTRODUCTION

Diseases caused by parasites are among the leading causes of death and disease especially in developing tropical countries like India. One of the major modes of transmission of parasites to humans is via consumption of Vegetables. Market vegetables are often contaminated by eggs of human intestinal nematodes where night soil is extensively used as fertilizer or wastewater reuse is practiced (Mahvi AH, Kia EB, 2006). Both crop consumers and the agricultural workers have been identified as being at high risk from soil and wastewater transmitted infection. Many studies have revealed that many types of vegetables, purchased at markets in different regions from many developing countries, were contaminated with helminthes eggs and larvae (Damen JG et al 2007, Muniswamappa K et al 2012, Wafa AI, Al-Megrin, 2010). The Mangalore cuisine being one that incorporates a high amount of the vegetables in daily meals makes the population more susceptible to parasitic infiltration. However, on perusal of research proceedings in Mangalore, it was revealed that no studies had been carried out regarding the parasitic contamination of commercially purchased vegetables in this area. Therefore this study is undertaken to know the prevalence of parasites in samples of fresh leafy vegetables from various wholesale and retail markets in Mangalore and to recognize and infer the higher incidence of certain parasitic infestations in these vegetables.

METHODOLOGY

A total of 100 samples fresh leafy vegetable composed of green and red spinach, coriander, mint, fenugreek, drumstick leaves and casia tora were purchased from various wholesale and retail markets in Mangalore and screened for the presence of parasites between April 2014 to Jan 2014. The 100 gm of the each sample was chopped into small pieces, taken into sterile plastic bags and washed with physiological saline solution (0.85% NaCl). The washed water was left for 10 h for sedimentation and then the top layer was discarded and the remaining washing water is centrifuged. The supernatant was discarded, the residue was carefully collected and examined in lugol iodine stained slides in triplicates for each sample through light microscopy. The results were analysed by descriptive statistics like frequency, percentage and mean.

RESULTS

Out of 100 samples 42 were contaminated with parasites. Mint and red spinach showed the highest contamination of 60.86% and 53.84% respectively. Drumstick leaves and casia tora did not show any contamination. Table 1 shows the distribution of intestinal parasites in various green leafy vegetables. The predominant parasite was *Ascaris lumbricoides* 10 (23%) out of 42 positive samples. Table 2 shows presence of intestinal parasite in leafy vegetable. The highest rate of contamination was seen during pre monsoon and post monsoon compared during monsoon table-3.

Table 1: Distribution of intestinal parasites in a different vegetable

Vegetables	No examined	No of positives (%)
Fenugreek leaves	16	6 (37.5%)
Coriander leaves	15	6 (40%)
Mint leaves	23	14 (60.86%)
Green Spinach	23	9 (39.13%)
Red Spinach	13	7(53.84%)
Drumstick leaves	5	0
Casia Tora	5	0

Table 2: Prevalence of intestinal parasite in leafy vegetable

Parasite	No infected
<i>Ascaris lumbricoides</i>	10 (23%)
<i>Trichuris trichuira</i>	4 (9.52%)
<i>Taenia</i> eggs	5 (11.90%)
<i>Ancylostoma</i>	4 (9.52%)
<i>Strongyloides</i> larvae	3 (7.14%)
<i>Toxocara</i> Spp	3 (7.14%)
<i>Trichomonas</i>	2 (4.76%)
<i>Giardia vaginalis</i>	6 (14.28%)

Table 3: Seasonal prevalence

Season	No examined	No contaminated
Pre monsoon(April - June)	40	20
Monsoon(July, August)	25	6
Post monsoon(Oct – Jan)	35	16

DISCUSSION

Unwashed fruit and vegetables are a big source of parasite carriers. A lot of vegetables are eaten raw and diseases from fruit and vegetables are on the rise. The practice of eating out is also on the rise. Salad bars, infected food handlers, and improperly washed fruits and vegetables are all sources for parasites. These parasites can pollute salad greens and other vegetables in many ways. From growth to gourmet table all areas are open to contamination. They might be present in the soil that crops are grown in, in animal manure used for fertilizer, or the water used to irrigate crops. They might be present on the hands of field workers or people working in processing plants, or in water used to pre-wash produce. They might be introduced in packaging or somewhere during transport, or even the spray used to keep produce fresh on grocery store shelves.

Our study revealed greens purchased from local markets were highly contaminated with parasites. In this part animal manure is used as fertiliser as most families in the villages grow green leafy vegetables at home and sold at local markets. The similar findings were also noticed by others ((Damen JG et al 2007, Wafa AI, Al-Megrin, 2010). Mint leaves were the most contaminated and eggs of *Ascaris* (23%) were present in most of the greens examined as eggs of *A.lumbricoides* are difficult to wash off due to their adhesive nature (Anuar AK, Ramachandran CP, 1977).

Similar finding was also noticed by Gupta et al in their study (Gupta N et al, 2009). The next common parasite seen was *Giardia* (14.2%). The Presence of *Toxocara Spp* indicates contamination by animal faeces. Few of the studies also revealed similar findings (Abougrain AK et al, 2010, Said DS, 2012) though they also noticed other parasitic eggs like *Entamoeba*, *cryptosporidium* and *microsporidium* which were not seen in our study. Several factors may contribute to such differences like geographical area, category of samples examined, methods used for detection of the intestinal parasites, type of water used for irrigation, and processing of such vegetables which are different from country to another.

With respect to seasonal variation, pre and post monsoon periods showed more contamination compared to rainy season. This is consistent with other studies (Wafa AI, Al-Megrin, 2010, Abougrain AK et al, 2010, Said DS, 2012). As this region receives very heavy rain, parasites must have washed away. The other reason being warm climate accelerated egg development and increased hatching rate and larval survival in response to accumulating thermal energy (Hernandez AD et al, 2013).

Sadly, no amount of washing will remove all of these parasites: they are simply too small and too easily lodged in the crevices and creases of plant material. Safe water supply and sanitation programme at the household and community level should be implemented. In areas where human excreta are used as organic fertilizer, people should be educated and motivated to use only the fully digested or properly composted human excreta and not to apply the raw or partially digested excreta to the field. Fully digested excreta are taken from a latrine pit where it has been sufficiently stored for one to two years. During this period, disease pathogens and worms' eggs have died out completely. It will not pollute the soil or the environment as well as the vegetables grown in the field. An integrated de-worming and WES programme should also educate people about the proper method of composting the human excreta for use as organic fertilizer (Luong TV, 2014).

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