

SHORT ARTICLE

Bioavailability of iron and zinc in green leafy vegetables growing in river side and local areas of Allahabad districtBhawna Srivastava¹, Anisha Verma² Neerubala³¹Research Scholar, ²Assistant Professor, Department of Food and Nutrition, SHIATS, Allahabad ³Associate Professor, Department of Food and Nutrition, SHIATS, Allahabad

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Introduction: Green Leafy Vegetables (GLVs) are the treasure trove of many micronutrients. **Objective:** The aim of the study is to find out the commonly growing vegetables in river side and local areas of Allahabad district and to access the bioavailability of iron and zinc in selected green leafy vegetables of river side and local areas of Allahabad district. **Methods:** Five to four commonly grown green leafy vegetables were selected from the Arailghat, Baluaghat, Gaughat, Mahewa, Muirabad, Rajapur, Rasullabad for the study. Total iron and zinc in sample were estimated by AOAC (2005) and bioavailability of zinc and iron from various food samples was determined in vitro method described by Luten (1996). Appropriate statistical technique was adopted for analysis of study. **Result:** Soya leaves, Radish leaves, Amaranth, Spinach were grown in both the areas except Kulpha and Karamwa, which are commonly grown in river side area. There was a significant difference between the bioavailability of iron and zinc in GLV grown in local and river side area. **Conclusion:** Hence it can be concluded that there is a contamination of heavy metals which binds with the iron and zinc and make them less bioavailable in the selected GLV.

Key Words

Green Leafy vegetables; Bioavailability; micronutrients

Introduction

The diverse agro-climatic conditions have blessed India with a vast resource of greeneries wherein wide array of green leafy vegetables are available. Being cost effective, Green Leafy Vegetables (GLVs) are the treasure trove of many micronutrients. Vegetables form an essential part of the diets of rich and poor alike, as majority of the Indian population rely on vegetarian foods for meeting nutritional requirements. GLVs are rich sources of carotenoids (Vitamin A) as well as iron, calcium, ascorbic acid, riboflavin, folic acid and appreciable amounts of other minerals (Devdas and Saroja, 1980; Prakash and Pal, 1991). According to Indian Council of

Medical Research, 100 g of GLVs are required by an adult man but the consumption is found to be only 10-20 g meeting only 20 per cent of the requirement (Gopalan *et al*, 2004). Low consumption of GLVs leads to lower intake of micronutrients, which is one of the causes of mineral deficiencies including iron and zinc in particular, among majority of the population.

Besides all these nutrients, GLVs also contain many substances like tannins, phytates, oxalates, etc., which inhibit mineral absorption and utilization. Vegetables, especially those of leafy vegetables grown in heavy metals contaminated soils, accumulate higher amounts of metals than those grown in uncontaminated soils because of the fact

that they absorb these metals through their leaves (Muhammad *et al*, 2008).

The problem of malnutrition is assuming seriousness in the vulnerable groups' viz., adolescents, pregnancy, lactation and school children, not because of poverty but because of ignorance, illiteracy and callousness of the people. The lack of knowledge especially on the nutritive value of these green leafy vegetables among the public in general is the main drawback in their lower consumption. The information on zinc and iron content of the food is reasonably adequate whereas, knowledge of iron and zinc bioavailability is sporadic. Very few studies are available on the bioavailability of these trace minerals from food system. This knowledge gap continues because accurate measurement of available minerals in foods is difficult, expensive and time consuming.

Aims & Objectives

1. To find out the commonly growing vegetables in river side and local areas of Allahabad district.
2. To access the bioavailability of iron and zinc in selected green leafy vegetables of river side and local areas of Allahabad district.

Material and Methods

The study entitled "Bioavailability of iron and zinc in green leafy vegetables growing in river side and local areas of Allahabad district" was conducted by using the following methodology based on the nature of problem and objective.

1. Selection of Vegetables- 5 to 4 commonly grown green leafy vegetables were selected from the Arailghat, Baluaghat, Gaughat, Mahewa, Muirabad, Rajapur, Rasullabad.
2. Analysis of bioavailability of iron and zinc-
 - a. Total iron and zinc (Ranganna, 1994): The dry ash was converted into solution. Total iron and zinc in sample were estimated by injecting mineral solution into Atomic Absorption Spectrophotometer (Avanta, GBC).
 - b. Bioavailability of iron and zinc: Bioavailability of zinc and iron from

various food samples was determined by an in vitro method described by Lutén *et al* (1996). Bioavailability (%) was calculated as follows: bioavailability (%) = 100 x Y/Z, where, Y is the element content of the bioavailable fraction (mg mineral element /100 g of sample), and Z is the total zinc or iron content (mg mineral element /100 g of sample).

Statistical analysis - Data obtained was analyzed using appropriate statistical technique. (T-test)

Results

Soya leaves, Radish leaves, Amaranth, Spinach were grown in both the areas except Kulpha and Karamwa, which are commonly grown in river side area.

In polluted river environments, most of iron and zinc is scavenged by non-detrital carbonate minerals, organic matter and oxide minerals (Prusty and others, 1994). The bioavailability of zinc and iron were more in green leafy vegetables grown in local areas whereas bioavailability of iron and zinc were less in green leafy vegetable of river side area.

Discussion & Conclusion

Soya leaves, Radish leaves, Amaranth, Spinach were grown in both the areas except Kulpha and Karamwa, which are commonly grown in river side area. The bioavailability of zinc and iron were more in green leafy vegetables grown in local areas whereas bioavailability of iron and zinc were less in green leafy vegetable of river side area which may be due to heavy metals present in the river.

References

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Tables

TABLE 1 COMMONLY GROWING VEGETABLES IN RIVER SIDE AND LOCAL AREAS OF ALLAHABAD DISTRICT

Local Area	River Side Area
Methi	Methi
Spinach	Spinach
Amaranth	Amaranth

Radish leaves	Radish leaves
Soya leaves	Soya leaves
	Karamwa
	Kulpha

TABLE 2 MEAN SCORE OF TOTAL AND BIOAVAILABLE ZINC IN GREEN LEAFY VEGETABLES IN LOCAL AREA AND RIVER SIDE AREA

Particulars	Methi	Spinach	Amaranth	Radish leaves
Local area	0.15 mg	0.25 mg	0.18 mg	0.20 mg
Difference	0.05	0.05	0.06	0.08
River side area	0.09 mg	0.12 mg	0.14 mg	0.11 mg
difference	0.11	0.18	0.10	0.17
Standard value	0.20	0.30	0.24	0.28
t-cal (Local area)	1.543	1.543	1.603	1.738
t-cal (River side area)	1.178	1.210	0.534	0.392

TABLE 3 MEAN SCORE OF TOTAL AND BIOAVAILABLE IRON IN GREEN LEAFY VEGETABLES IN LOCAL AREA AND RIVER SIDE AREA

Particulars	Methi	Spinach	Amaranth	Radish leaves
Local area	1.5 mg	0.55 mg	3.0 mg	0.25 mg
Difference	0.43	0.59	0.49	0.09
River side area	1.0 mg	0.95 mg	2.25 mg	0.12 mg
Difference	0.93	0.19	1.24	0.22
Standard value	1.93	1.14	3.49	0.34
t-cal (Local area)	0.606	0.5168	0.3921	0.2805
t-cal (River side area)	1.414	0.1794	1.428	1.210