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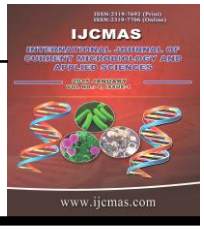

Original Research Article

Estimation of ascorbic acid content in fruits & vegetables from Hyderabad, India – A theoretical assessment of Vitamin C activity

Deekshika B, Praveena Lakshmi B, Hemanth Singuluri and M.K. Sukumaran*

Department of Biochemistry, Bhavan's Vivekananda College, Secunderabad, Telangana, India
**Corresponding author*

A B S T R A C T

Keywords

Ascorbic Acid, Vitamin C, 2,4 – Dichlorophenol Indophenol method, Titrimetric analysis.

The ascorbic acid content of selected fruits and vegetables were collected from a local market and the ascorbic acid content in these fruits and vegetables were determined by volumetric method. The results obtained are represented as mean ± standard deviation. Ascorbic acid content was highest in *Mangifera indica* 54.78 ± 2.19 mg/100g (Mango) and lowest in *Musa acuminate*20.13 ±1.54 mg/100g (Banana) among the different fruits tested. In the case of vegetables highest ascorbic acid content was found in *Coriandrumsativum*123.52 ± 6.21mg/100g (Coriander) and lowest in *Daucuscarota*2.6 ± 0.72 mg/100g (Carrot). These results clearly suggest that a wide variety of fruits and vegetables can be consumed to meet the daily requirements of vitamin C in a cost effective manner.

Introduction

Vitamin C is defined as the generic term for all compounds exhibiting the biological activity of L-Ascorbic Acid. Vitamin C is the most important vitamin in fruits and vegetables. It is the major water soluble anti – oxidant within the body. Ascorbic Acid is the principal biologically active form but L-dehydroascorbic acid, an oxidation product also shows biological activity.

Vitamin C is required for the prevention of scurvy and maintenance of healthy skin, gums and blood vessels. It functions in collagen formation, absorption of inorganic iron, reduction of plasma cholesterol level, enhancement of the immune system and reaction with singlet oxygen and other free radicals (Rickman *et al.*, 2007). As an antioxidant, it also reduces the risk of atherosclerosis and some forms of cancer. Recommended daily allowances (RDA) of 75 mg/day and 90 mg/day have been established for adult women and men respectively, and 45 mg/day for children of 9–12 years old. This study will show the amount of ascorbic acid present in the fruits and vegetables collected, this specific determination of the ascorbic acid content of fruits and vegetables is extremely important to understand the relationship of dietary ascorbic acid intake and human health

(Marti *et al.*, 2009; Chakraborthy *et al.*, 2014; Rekha *et al.*, 2012).

Materials and Methods

Fresh fruits and vegetables were purchased from local market in Hyderabad city. Before the extraction procedure, all the samples were thoroughly cleaned using deionized water to remove any adhering contaminants if present. Vitamin C in the samples was determined on the same day of purchase to avoid the instability of vitamin C.

5gof the edible portion of each of the samples were accurately weighed and ground to a paste in a mortar and pestle with the addition of 10 ml of 4%(w/v) oxalic acid. The mixture was further ground and strained through a muslin cloth and the final volume of the extract was made up to 25 ml with 4% oxalic acid in a standard flask. The analysis of the sample was based on the 2,4-D dye used (Rao and Deshpande, 2006; Rekha, 2012).

Results and Discussions

The ascorbic acid content of the fruits and vegetables were determined by titrimetric analysis and results are summarized in tables I and II respectively. The results obtained were comparable to the results of other studies carried out on the estimation of vitamin C from some local fruits and vegetables. (Rahman *et al.*, 2008; Vasanth Kumar *et al.*, 2013).

Results presented in table I indicates that the highest content of vitamin C to be present in *Mangifera indica* (Mango) (54.78 ± 2.19 mg/100g), and lowest in the case of *Musa acuminate* (Banana) (20.13 ±1.54 mg/100g). It is also observed that both *Citrus tangerina* (Orange) and Citrus *limetta* (Sweet Lime) showed almost similar vitamin C content. Another finding is that *Vitis vinifera* (Black grape), *Vitis vinifera*(Green grape) and *Musa acuminate* (Banana) showed similar vitamin C content with a variation of about 2-3mg among these fruits.

Table.1 Amount of ascorbic acid in fruits

S.No	Name of Fruit	Vitamin C (mg/100g) Mean± Standard Deviation
1.	*Mangiferaindica* (Mango)	54.78 ± 2.19
2.	*Citrus tangerina* (Orange)	47.84 ±4.74
3.	*Citrus limetta* (Sweet Lime)	47.41±1.70
4.	*Manilkarazapota* (Sapodilla)	33.08± 1.89
5.	*Vitisvinifera* (Black grape)	23.55± 0.95
6.	*Vitisvinifera* (Green grape)	22.52 ± 2.43
7.	*Musa acuminate* (Banana)	20.13 ±1.54

In the case of vegetables, *Coriandrum sativum* (Coriander) showed the highest vitamin C content (123.52 ± 6.21 mg/100g), while *Daucus carota* (Carrot) showed lowest vitamin C content (2.6 ± 0.72 mg/100g). Unlike the vitamin C content in fruits, only *Brassica oleracea* (Cabbage) and *Momordica charantia* (Bitter gourd) showed some similarity in the vitamin C content with a variation of about 5mg. The vitamin C content in all the other vegetables varied significantly ranging from88.58 ± 3.46 mg/100g for *Momordica charantia* (Bitter gourd) to 2.6 ± 0.72 mg/100g for *Daucus carota*(Carrot)(table II).

Table.2 Amount of ascorbic acid in vegetables

S.No	Name of Vegetable	Vitamin C (mg/100g) Mean± Standard Deviation
1.	*Coriandrum sativum* (Coriander)	123.52± 6.21
2.	*Capsicum frutescens* (Green chilly)	110.63± 4.81
3.	*Brassica oleracea* (Cabbage)	105.58± 8.16
4.	*Momordica charantia* (Bitter gourd)	88.58 ± 3.46
5.	*Solanum melongena* (Eggplant or Brinjal)	44.33 ± 4.56
6.	*Spinacia oleracea* (Spinach)	26.31 ± 0.98
7.	*Solanum lycopersicum* (Tomato)	24.91 ± 1.91
8.	*Solanum tuberosum* (Potato)	17.04 ± 1.18
9.	*Allium sativum* (Garlic)	13.06 ±1.10
10.	*Daucuscarota* subsp. *sativus* (Carrot)	2.6 ± 0.72

Based on the above results the following conclusions can be drawn.

*In the case of fruits, *Citrus tangerina* (Orange) or *Citrus limetta* (Sweet Lime) and *Vitis vinifera* (Black grape) or *Vitis vinifera* (Green grape) or *Musa acuminate* (Banana)can be used as alternative sources of vitamin C depending up the availability of these fruits.

*In the case of vegetables similarity of vitamin C content was observed only in the case of *Capsicum frutescens* (Green chilly) and *Brassica oleracea* (Cabbage), while all the other vegetables varied considerably in their vitamin C content.

Based on the above findings it can be suggested that one can select a particular fruit or vegetable for the daily requirement of vitamin C depending upon the availability in market and upon the age group of an individual.

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