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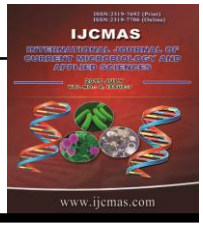

Original Research Article

Determination of Ascorbic Acid Content in Some Indian Spices

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A B S T R A C T

Keywords

Ascorbic acid, Vitamin C, spices, titrimetric method

Ascorbic acid, an important water soluble vitamin is essential for collagen, carnitine and neurotransmitters biosynthesis. In the present study, ascorbic acid content was evaluated in some of the commonly used Indian spices by 2, 6-dichlorophenol indophenol (DCPIP) titration method. Results obtained are represented as mean ± standard deviation values. Results indicate that there was a considerable variation in ascorbic content among the different spices. Ascorbic acid content was highest in bay leaf 39.54 ± 0.84mg/100g and lowest in poppy seeds 1.43 ± 0.11mg/100g.

Introduction

Ascorbic acid (trivial name-Vitamin C) is an essential constituent in ones daily life. Biomolecules of plant origin play a crucial role in promotion and maintenance of health (Watson RR., 2001). In Asian countries (India, China, Japan and Korea) foods and plant materials are traditionally exploited for their healing properties. These materials in addition, occupy an important place in traditional cures as medicines (Valiathan Ms., 2004). Phytochemicals in spices, which play a major role in plant protection, are considered vitamins of the 21st Century. Phytochemicals are less toxic compared to drugs. The scientific findings on some common spices (turmeric, fenugreek, mustard, ginger, onions and garlic) are used in folk medicines of several Asian countries (Kamala Krishnaswamy MD., 2008).

Antioxidants that are prepared commercially contain Ascorbyl palmitate. L-ascorbic acid and its fatty acid esters are widely used as food additives, antioxidants, browning inhibitors, reducing agents, flavour stabilizers, dough modifiers and colour stabilizers. Ascorbic acid deficiency leads to scurvy. Characteristic features of scurvy includes, spongy swollen bleeding gums, dry skin, open sores on the skin, fatigue, impaired wound healing and depression (Olson RE., 1999).

Physiological functions of ascorbic acid

Ascorbic acid serves as an important co-factor for enzymes (hydroxylases and mono-oxygenase) which are involved in the

synthesis of collagen, carnitine and neurotransmitters (Levin M., 1986). The beneficial effects of ascorbic acid in health and disease are given in articles (Pauling L., 1970, Shukla SP., 1969 and Hellman L and Burns JJ., 1958). The above findings have prompted us to determine the levels of Ascorbic acid in some selected Indian spices.

Materials and Method

Spices

Spices, poppy seeds, cumin seeds, coriander seeds, fennel seeds, fenugreek seeds, mustard seeds, black pepper, cinnamon, clove, bay leaf, ginger, garlic, onion (red), curry leaves and mint leaves were purchased from local market in Hyderabad city.

1. **4% (w/v) Oxalic acid:** 40g of oxalic acid in 1000 mL of distilled water.
2. **Dye solution:** 84mg of sodium bicarbonate and 104mg of 2, 6-dichlorophenol indophenol in 400 mL of distilled water.
3. **Ascorbic acid stock standard:** (1mg/mL): 100mg in 100 mL of 4% oxalic acid.
4. **Ascorbic acid working standard:** (100µg/mL): 10 mL of the ascorbic acid stock standard diluted to 100 mL with 4% oxalic acid.
5. **Sample extraction**
   Before the extraction procedure, all the samples were thoroughly cleaned with deionized water to remove any adhering contaminants if present. The samples (poppy seeds, cumin seeds, coriander seeds, fennel seeds, mustard seeds, black pepper, cinnamon and clove) were air dried in shade and oven dried at 40^0C for 96 h until constant weight was gained. 5g of the sample (either dried powder or fresh material {ginger, garlic, onion, curry leaves and mint leaves}) was accurately weighed and ground in a mortar and pestle or electric grinder with the addition of 10 mL of 4% oxalic acid. The mixture was further ground and strained through four layers of muslin cloth. The final volume of the extract was made up to 25 mL with 4% oxalic acid in a standard flask. All the samples were similarly treated.

Determination of ascorbic acid content in spices

Ascorbic acid content of some Indian spices were determined by 2, 6-dichlorophenol indophenol (DCPIP) titration method described by Rao, B. and Deshpande, V (Rao, B. and Deshpande, V., 2006). 5 mL of the ascorbic acid working standard (500µg/5 mL) and 10 mL of 4% oxalic acid were pipetted out into a 100 mL conical flask. The contents in the flask were titrated against the dye solution (V_1) until the appearance of a pale pink colour that persisted for a few min. 5 mL of the test sample was similarly titrated against the dye solution (V_2). Ascorbic acid content present in the test samples were determined using the formula:

$$\text{Amount of ascorbic content (mg/100g)} = \frac{500 \times V_2 \times 25 \times 100}{V_1 \times 5 \times 5}$$

Where;

500 = µg of standard ascorbic acid taken for titration

V_1 = Volume of dye consumed by 500µg of standard ascorbic acid

V_2 = Volume of dye consumed by 5 mL of test sample

25= Corresponds to total volume of the extract

100 = Ascorbic acid content/100g of the sample
5 = Weight of sample taken for extraction
5 = Volume of the test sample taken for titration

Results and Discussion

Ascorbic acid content of some Indian spices was determined by DCPIP titration method. Representative photograph of standard and test samples depicting the development of pale pink colour at the end of titration is shown in figure 1. Results are represented as mean ± standard deviation values (table 1). As evident from the results presented in table 1, a wide variation in ascorbic acid content (figure 2) was observed among the spices that varied from 39.54 ± 0.84 to 1.43 ± 0.11mg/100g. Ascorbic acid content was highest in bay leaf (39.54 ± 0.84mg/100g) and lowest in poppy seeds (1.43 ± 0.11mg/100g). Among the different spices evaluated, five spices (cumin seeds, fenugreek seeds, black pepper, ginger and onion (red)) showed similar ascorbic acid content (7mg/100g) with slight variations. The ascorbic acid content obtained for some of the spices in our study are comparable with those reported in literature (Manas Denre., 2014 and http://www.nutrition-and-you.com/healthy_spices.html)

Ascorbic acid, an essential vitamin for human health is required for many physiological functions. Highest ascorbic acid content was observed for bay leaf (39.54 ± 0.84mg/100g) and lowest in poppy seeds (1.43 ± 0.11mg/100g). Ascorbic acid content varied significantly among the different spices evaluated. It can be suggested that incorporation of small amounts of spices in once daily food items may be beneficial to human health.

Table.1 Ascorbic acid content (mg/100g)

S. No	Spices	Scientific name	Mean ± SD (mg/100g)	Reported* Value (mg/100 g)
1	Poppy seeds	*Papaver somniferum*	1.43 ± 0.11	1.0
2	Cumin seeds	*Cuminum cyminum*	7.80 ± 0.48	7.7
3	Coriander seeds	*Coriandum sativum*	5.94 ± 0.47	21.0
4	Fennel seeds	*Foeniculum vulgare var. dulce*	12.26 ± 0.30	21.0
5	Fenugreek seeds	*Trigonella foenum-graecum*	7.07 ± 1.27	3.0
6	Mustard seeds	*Brassica juncea*	6.01 ± 0.17	7.1
7	Black Pepper	*Piper nigrum*	7.89 ± 0.35	21.0
8	Cinnamon	*Cinnamonum verum*	3.58 ± 0.19	3.8
9	Clove	*Sygizium aromaticum*	15.87 ± 0.82	11.7
10	Bay leaf	*Laurus nobilis*	39.54 ± 0.84	46.5
11	Ginger	*Zingiber officinale*	7.16 ± 0.48	5.0
12	Garlic	*Allium sativum*	13.49 ± 0.89	31.2
13	Onion (red)	*Alluim Cepa*	7.54 ± 0.99	7.4
14	Curry leaves	*Murraya koenigii*	22.53± 0.69	4.0
15	Peppermint	*Mentha piperita*	8.59 ± 0.88	31.8

*Ascorbic acid content as reported: http://www.nutrition-and-you.com/healthy_spices.html

Figure.1 Determination of ascorbic acid content

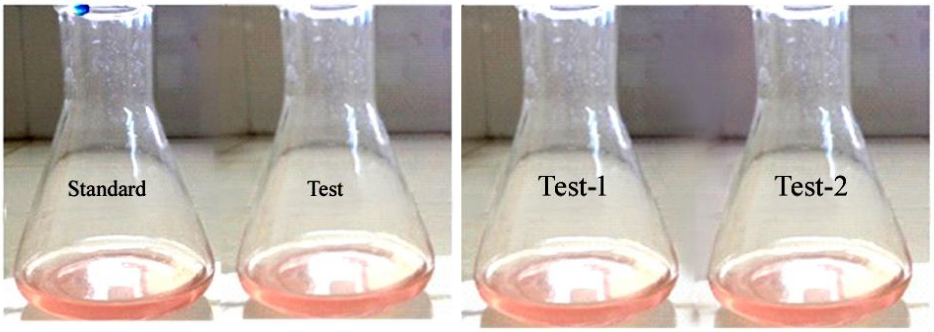
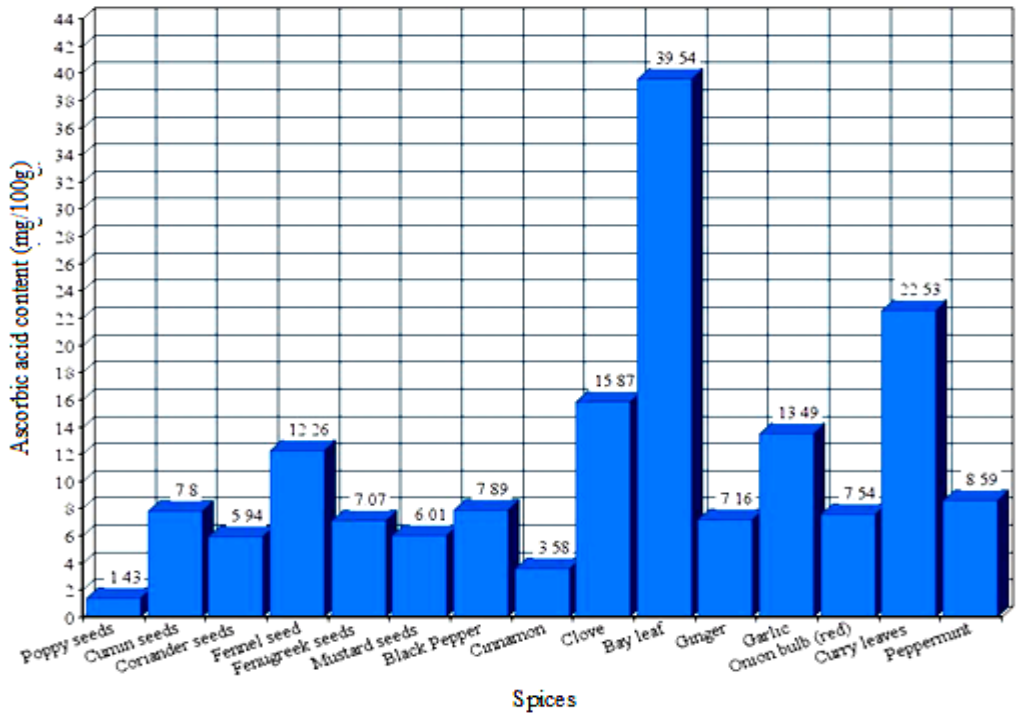


Figure.2 Ascorbic acid content of different spices



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References

Hellman L and Burns JJ (1958): Metabolism of L-ascorbic acid-1-C14 in man. *J Biol Chem*, 230:923-930.

Kamala Krishnaswamy MD (2008): Traditional Indian spices and their health significance, Asia Pac J Clin Nutr; 17(S1):265-268.

Levin M (1986): New concepts in the biology and biochemistry of ascorbic acid. *New Engl J Med*, 31:892-902.

Manas Denre (2014): Determination of vitamin c, total phenol and antioxidant activity of some commonly cooking spices crops used in West Bengal, Int. J. Plant physiol. Biochem. Vol.6(6), pp.66-70

Olson RE: Water soluble vitamins (1999). In: *Principles of Pharmacology* Edited by: *Munson PL, Mueller RA, Bresse GR. Chapman and Hall, New York*: Ch 59.

Pauling L (1970): Vitamin C and common cold. *Freeman, San Francisco, CA*.

Rao, B. and Deshpande, V. (2006): *Experimental biochemistry*. Tunbridge Wells, Kent: Anshan.

Shukla SP (1969): Level of ascorbic acid and its oxidation in the liver of Scorpion. *Palamnaeus bengalensis. Experentia,* 25:602-604.

Valiathan Ms, (2004): The Legacy of Caraka, Chennai, India, Orient Longman Ltd.,

Watson RR. (2001): Vegetables, fruits and herbs in health promotion. London, Washington DC, CRC Press.

http://www.nutrition-and-you.com/healthy_spices.html