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Estimation of Vitamin C Content in Artificially Packed Juices of Two Commercially Attracted Companies in Relation to Their Significance for Human Health

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ABSTRACT: The objective of this study was to determine the vitamin C content in artificially prepared juices of orange, grapes, apple and mango juices of two different local companies i.e., Nestle and Shezan from Quetta city of Pakistan by titrimetric method. The method used in the present study was found to be cheap, accurate and could be easily practice in routine analysis. The obtained results of present study indicated that the concentration of vitamin C in Company A (Nestle) was recorded as i.e., 16.2, 9.26, 5.6, 4.8g/l for Orange, red grapes, apple and mango juices, respectively. While the content of vitamin C in company B (Shezan) was noted as7.4, 6.4, 5.04 and 4.06g/l for orange, red grapes, apple and mango juices, respectively. From the obtained results, it has been concluded that the content of Vitamin C was less variable among artificial juices prepared in two different companies selected in the present study. Moreover, it was also observed that the artificial preserved juices contain lesser amounts of vitamin C as compare to freshly prepared juices. Hence, the information provided in the presence study could be useful for the knowledge about the nutritional quality of commercially available packed fruit juices for human health.

Keywords: Vitamin C, Titrimetric method, Artificial preserved juices.

INTRODUCTION

The principal vitamin available in fruit juices is vitamin C, chemically known as ascorbic acid (AA). It is a powerful antioxidant naturally present in food and food products. It plays an important role in the prevention of infectious diseases. Vitamin C is also known as Ascorbic acid, L-ascorbic acid and the Antiscorbutic Vitamin. More than 90% of the vitamin C in human diets is supplied by vegetable, fruits and fruit juices (Alibone, 2000).

Different kinds of fruits are processed into juices. During processing of fruits into juices, the loss of some nutrients occur due to which than sugars, acids, colorants, water, preservatives and other additives are often added into the pure juice for long-term preservation. Loss of Vitamin during processing is also of great concern for nutritionists, processors and consumers. The taste and health benefits of the processed juices are inclined by variations in the composition of the sugars, organic acids and vitamins. Since vitamin C is an important indicator and used for the determination of fruit quality. The determination of vitamin C has become vital because it is a labile substance, which is easily degenerated by atmospheric oxygen and enzymes. It also undergoes oxidation under the influence of light and heat. This makes it important to supervise its variation during manufacturing and storage (Tyagi *et al.*, 2014).

In packed juices quantification of sugars gave an evaluation of the quantity of artificial sugar present in packed juices (Jahren *et al.*, 2006). Citric and malic acids can be used as "fingerprints" representing characteristics of individual fruit juice (Shui and Leong, 2002; Soyer *et al.*, 2003). This allows recognition of different origin and fermentation added in fruit juices. All these factors require the need for steadfast techniques to perceive the quality of juices. Packing of commercial juices also does not provide information about the content of vitamin C.

Considering the prevalence of these packed juices which are frequently used by all age groups, knowledge of their contents need consideration. Therefore, the present work was conducted to determine the vitamin C content in artificial packed juices of two different commercially attracted companies by using titrimetric method in order to observe their nutritional quality for human health.

MATERIALS AND METHODS

The commercially packed fruit juices of Orange, Red Grape, Apple and Mango of two different commercially attracted companies were purchased from local market of Quetta city. Experiments were conducted in the chemistry department of SBK women's university Quetta during June to August 2015.Content of vitamin C from the packed juices was determined by method described by Helmenstine, 2006 was as follows;

Preparation of Reagents and estimation of Vitamin C

(i) 1% starch indicator solution: 1% starch indicator solution was prepared by adding 0.50g soluble starch to 50 ml of distilled water. Mixed well and allowed for cooling before use.

(ii) Iodine Solution: Iodine Solution was prepared by mixing 5.00 g potassium iodide (KI) and 0.268 g potassium iodate (KIO_3) were dissolved into 500 ml beaker with 200 ml of distilled water. An amount of 30 ml of 3 molar sulfuric acid was added into the beaker and then diluted with distilled water until 500 ml solution.

(iii) Vitamin C Standard Solution: Vitamin C Standard Solution was prepared by dissolving 0.250 g vitamin C in the beaker with 100 ml distilled water. The solution was transferred into 250 ml volumetric flask and diluted to 250ml with distilled water.

(iv) Standardizing Solutions: Standardization of iodine solution with the vitamin C standard solution was by pipetting 25ml of vitamin C solution into a 125 ml Erlenmeyer flask. 10 drops of 1% starch solution were added and then titrated against iodine solution until blue-black colour was observed.

(v) Titration Calculations: Titrations were repeated in triplicates.

(a) Calculate the ml of titrant used for each flask. Take the measurements obtained and average them.
Average volume =total volume/ number of trials

(b) Vitamin c is calculated from the following formula:
10.00ml iodine solution/ 0.250g vitamin C = 6.00ml iodine solution / Xml vitamin C 40.00X = 6.00
X = 0.15 g Vitamin C in that sample

(c) For Volume of sample, other calculations are made such as gram per liter. For a 25ml juice sample, for example;
0.15g/ 25 ml = 0.15g / 0.025 L = 6.00g/L of vitamin C in that sample.

RESULTS AND DISCUSSION

Vitamin C content in four artificially prepared juices i.e., Orange, red grapes, apple and mango juices of two different companies such as, Company A (Nestle) and Company B (Shezan) are tabulated in Table 1. The obtained results revealed that orange juice contain maximum amount of vitamin C that is 16.2g/liter (company A) and 7.4g/liter (Company B) as compare to the red grapes, apple and mango juices, respectively. While the red grapes and apple juices have high concentration of vitamin C than Mango juice but comparatively less than that of orange juice. From the obtained result, it has been concluded that the content of Vitamin C was less variable amongst two different companies selected for the present study. Furthermore, it had been found that the artificially preserved juices contain lesser amounts of vitamin C as compare to fresh and unpreserved juices. Much literature published on citrus fruit has focused on orange; because it is the main source of vitamin C (Sánchez-Moreno *et al.,* 2003; Smirnoff, 2001; Valpuesta and Botella, 2004).Tee *et al.* (1988) determined the vitamin C content of 19 types of fresh fruits and vegetables by dye titration and microfluorometry. The values obtained by latter method estimated that ascorbic acid plus dehydroascorbic acid (DHAA) were higher than those found by titration method, which determined only ascorbic acid.

Table 1: Shows the content of vitamin C (g/100ml) in four artificial packed juices obtained from the two different companies.

Juice Samples	Company A (Nestle) Vitamin C (g/l)	Company B (Shezan) Vitamin C (g/l)
Orange	16.2*	7.4*
Red grapes	9.26	6.4
Apple	5.6	5.04
Mango	4.8	4.06

*Shows the highest Vitamin C content

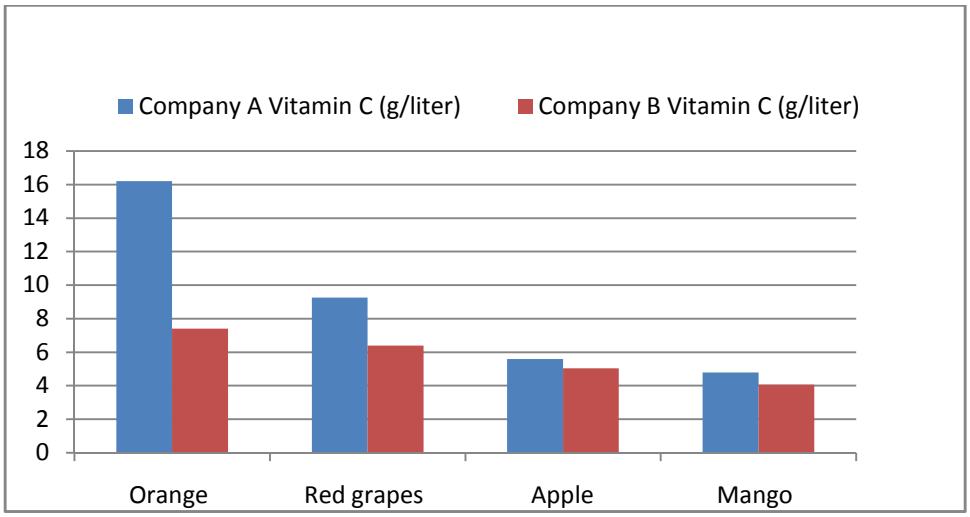

Fig. 1. Vitamin C content in four type juices of two different companies.

The content of vitamin C in citrus fruits by oxidation and reduction method was carried in Nigeria and found that vitamin C concentration is more in orange juice as compared to grape, lemon and lime juice, respectively (Njoku *et al.*, 2011). Another study in Nigeria is carried on quantitative estimation of ascorbic acid levels in matured ripe and unripe sweet oranges, lemons and grapefruits using redox titration involving oxidation-reduction conversion of ascorbic acid. The results suggest that the ascorbic acid levels in the unripe fruits were higher than the ripe ones but generally decreased upon increase in temperature, ripening and time of exposure. Orange has the highest ascorbic acid content followed by lemon and finally by grapefruit both in the unripe and ripe fruits at the various temperature conditions (Igwe, 2014).

One of the studies conducted in Valencia indicated that a vitamin C content of orange juice was 33–50 mg/100 ml obtained by squeezing the fruits (Aydogmus *et al.*, 2002). Another study in Ethiopia reported that the ascorbic acid content of freshly prepared Orange juice and old Orange juice were 41.4 ± 1.50 mg/100 mL and 32.4 ± 1.30 mg/100 mL respectively (Tiruwork and Ghirma., 2012). Wall (2006) used HPLC technique to determine vitamin C and pro vitamin A content of Banana and Papaya. In one study, Nour *et al.* (2010) developed the reversed phase HPLC method for separation and quantification of organic acids in fruit juices. In all citrus juices, they found that the most abundant organic acid was citric acid, ranging from 6.88 to 73.93g/l. The average ascorbic acid was highest in lemon juice followed by sweet orange juice, sweetie and white grapefruit.

Melo *et al.* (2006) reported (37.34mg/100g) value for orange and (141.97mg/100g) for papaya 'Hawaii' using 2,6 dichlorophenolindophenol (DCIP) in the titrimetric method. Aurelia *et al.* reported the ascorbic acid content of Lemon juice 54.74 mg/100ml and Orange juice 39.25 mg/ 100 ml by using Voltammetry Performed at Pt and Carbon Paste Electrodes. Okiei *et al.* (2009) reported that the ascorbic acid content of freshly prepared lemon juice is 48.61 mg/100 ml.

CONCLUSIONS

Vitamin C, the major vitamin can be efficiently analyzed and compared by iodometric titration method. From the results it can be concluded that among the two different commercially attracted companies content of vitamin C was variable amongst two different companies selected for the present study. From the obtained results. It was also concluded that fresh fruits have more amount of vitamin C as compared to artificial juices and drinks because fruit is pickled fresh, not stored, preserved or exposed to oxygen. Thus the present study will provide useful information for the nutritionalists as well as diet conscious peoples that normally used these commercially available packed fruit juices in their daily diet.

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