



**EFFECT OF STORAGE ON SOME BIOCHEMICAL PARAMETERS
OF SELECTED FRESH FRUITS JUICE**

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ABSTRACT

Juices of five selected fruits (orange, mango, apple, grape and pomegranate) were subjected to evaluate of some biochemical parameters on storage. Among all fresh juices studied mango was found to have highest total sugar content (14.8 ± 0.08 g/100ml) as well as pH (4 ± 0.04), orange and pomegranate were found to have high acidity (0.97 ± 0.06 g/100g) whereas vitamin-C was found in higher concentration in orange (20 ± 0.23 mg/100ml). There was only a small change in all the biochemical parameters studied on storage up to the period of 4 hrs.

KEYWORDS: Fresh fruit juices, biochemical parameters



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INTRODUCTION

A considerable interest has been developed over the years in fruits and vegetables due to their potential biological and health promoting effects. Numerous epidemiological studies indicate that an increase of various fatal diseases like cardiovascular disease, stroke, and cancer etc. The protective effect of fruits and vegetables has been attributed to their bioactive antioxidant constituents, including vitamins, carotenoids, polyphenols¹⁴. among various antioxidants present in fruits and vegetables, polyphenol oxidase (including anthocyanins) have received much attention since being reported to have a positive influence on human health. The consumption of polyphenol rich juice enhances antioxidant status, reduces oxidative DNA damages and stimulates immune cell functions⁴. The protection provided by their antioxidant can be explained by the capacity of active compounds to scavenge free radicals, which responsible for the oxidative damage of lipids, proteins and nucleic acids^{2, 11}.

MATERIALS & METHODS

The five selected fresh fruits, orange (*Citrus sinensis*), mango (*Mangifera indica*), grapes (*Vitis vinifera*), pomegranate (*Punica granatum*) and apple (*Malus domestica*) were purchased from local market of Allahabad. Fresh juices of these five selected fruits were prepared in the laboratory just before the experiments. All the experiments were run in triplicate for the estimation of following biochemical parameters.

Estimation of ascorbic acid in fresh fruit juices⁷

Ascorbic acid in all the fresh juices was estimated according to the iodometric titration method.

Estimation of total sugar in fresh fruit juices¹⁰

Total sugar in all freshly prepared fruit juices was estimated by titrimetric method.

pH of fresh fruit juices

pH of fresh fruit juices was done by using pH meter using standard pH buffers.

Determination of acidity in fresh fruits juice¹

Titerable acidity was determined by titration method .

RESULTS & DISCUSSION

The observations made with different freshly prepared fruit juice at various time intervals are presented in table.

Total sugar content

As it is clear from the table, total sugar was found to be maximum (14.8±0.08 g/100ml) in freshly prepared juice of mango followed by in decremental order by grape (14.1±0.01), apple (11.6±0.15 g/100ml), pomegranate (10.8±0.2 g/100ml) and orange (8.5±0.05 g/100ml). Total sugar content in all the samples decreased as time increased in hours. It was observed that in orange juice total sugar decreased from (8.5±0.05 g/100ml) gradually in four hrs. Whereas in pomegranate juice it decreased from 10.8±0.2 to 7.2±0.07 g/100ml, apple 11.6±0.15 to 9.3±0.06 g/100ml, grape 14.1±0.01 to 11.4±0.08 g/100ml and mango 14.8±0.08 to 12.7±0.04 g/100ml respectively.

pH

Table clearly indicates that pH was found to be maximum (4±0.04) in freshly prepared juice of mango followed by in decremental order by orange (3.8±0.06), grape (3.5±0.03), apple (3.2±0.01) and pomegranate (3.01±0.06). pH in all the samples decreased as time increased in hours. It was observed that in apple 3.2±0.01 to 3.01±0.06, pomegranate juice 3.01±0.06 to 2.3±0.05 pH decreased from gradually in four hrs. Whereas in grape juice is decreased from 3.5±0.03 to 2.4±0.08, orange 3.8±0.06 to 2.8±0.02 and mango 4±0.04 to 3.1±0.05 respectively. The decrease in pH from 4.0 to 3.0 in mango juice on storage due to decrease in citric acid in it⁹. Citric acid participated in browning reaction with amino acid and polyphenol.

Acidity

As it is clear from the table, acidity was found to be maximum (0.97 ± 0.06 g/100g) and (0.97 ± 0.06 g/100g) in freshly prepared juice of pomegranate and orange both. Followed by in decremental order by grape (0.69 ± 0.04 g/100g), mango (0.60 ± 0.08 g/100g), and apple (0.34 ± 0.09 g/100g) acidity content in all the samples decreased as time increased in hours. It was observed that in apple juice acidity decreased from 0.34 ± 0.09 to 0.24 ± 0.03 g/100g gradually in four hrs. Whereas in juice mango it decreased from 0.60 ± 0.08 to 0.53 ± 0.07 g/100g, grape 0.69 ± 0.04 to 0.61 ± 0.04 g/100g, orange 0.97 ± 0.06 to 0.9 ± 0.05 g/100g and pomegranate 0.97 ± 0.06 to 0.91 ± 0.08 g/100g respectively. The acidity values of Alphonso mango either packed in carton or control samples also showed a decreasing trend of acidity from 2.17 to 0.08% on the 12th day when stored at ambient temperature $27 \pm 1^\circ\text{C}$ with 65% relative humidity¹³. Acidity of mango juice decreased significantly during prolonged storage due to the citric acid present in the fruit juice exhibit co-polymerization reaction with amino acid, sugar and polyphenol as a result 0.05 to 1.9% acidity of mango juice was lost⁹.

Vitamin-C content

As it is clear from the table, Vitamin-C was found to be maximum (20 ± 0.23 mg/100ml) in freshly prepared juice of orange followed by in decremental order by pomegranate (18.96 ± 0.32 mg/100ml), grape (16.75 ± 0.67 mg/100ml), apple (15.10 ± 0.77 mg/100ml), and mango (14.65 ± 0.15 mg/100ml). Vitamin-C content in all the samples decreased as time

increased in hours. It was observed that in mango juice Vitamin-C decreased from 14.65 ± 0.15 to 11.18 ± 0.28 mg/100ml gradually in four hrs. Whereas in apple juice it decreased from 15.10 ± 0.77 to 11.74 ± 0.44 mg/100ml, grape 16.75 ± 0.67 to 13.23 ± 0.48 mg/100ml, pomegranate 18.96 ± 0.32 to 15.22 ± 0.36 mg/100ml and orange 20 ± 0.23 to 15.9 ± 0.20 mg/100ml respectively. The highest ascorbic acid contents in orange juice (22.4 mg/100ml) while mango juice had least (16.68 ± 0.15 mg/100ml)⁸. High content of Vitamin-C was present in citrus fruits as compared to the non citrus fruits such as apple and grapes. The differences in Vitamin-C content of regional varieties of fruits⁵. These differences in Vitamin-C content of fruits depend upon temperature condition for growth. During prolonged storage sucrose split into glucose and fructose, resultingly reducing sugar increases in stored fruit juices⁶. Hydrolysis is the major cause of sucrose reduction hence reducing sugar content increases in apple juices at a rate determined by pH and temperature¹⁵. Glucose also contributes more in browning than fructose as a co-polymerization with amino acids¹². Vitamin-C is a water soluble vitamin which cannot be stored in the body for a long duration; hence daily requirement should be met by fruits and vegetables¹⁶. Vitamin-C destruction also occur during storage, also more prone to destruction at high temperature, Enzyme ascorbate oxidase in the presence of residual air present in the fruit juice bottle caused destruction of Vitamin-C³.

Table
Variation of total sugars, pH, acidity and vitamin-C fresh fruits juices content at time intervals

Biochemical parameter (after)	Total sugar content (g/100ml)				pH				Acidity (g/100g)				Vitamin-C (mg/100ml)			
	1 hr	2 hrs	3 hrs	4 hrs	1 hr	2 hrs	3 hrs	4 hrs	1 hrs	2 hrs	3 hrs	4 hrs	1 hrs	2 hrs	3 hrs	4 hrs
Fruit Juices (fresh)																
Orange	8.5 ±0.05	7.9 ±0.01	7.1 ±0.03	6.2 ±0.01	3.8 ±0.06	3.6 ±0.05	3.2 ±0.02	2.8 ±0.02	0.97 ±0.06	0.95 ±0.04	0.92 ±0.08	0.9 ±0.05	20 ±0.23	19.1 ±0.24	17.6 ±0.17	15.9 ±0.20
Mango	14.8 ±0.08	13.8 ±0.02	13.3 ±0.02	12.7 ±0.04	4 ±0.04	3.7 ±0.03	3.4 ±0.01	3.1 ±0.05	0.60 ±0.08	0.57 ±0.02	0.55 ±0.04	0.53 ±0.07	14.65 ±0.15	13.98 ±0.26	12.68 ±0.32	11.18 ±0.28
Apple	11.6 ±0.15	10.9 ±0.06	10.2 ±0.04	9.3 ±0.06	3.2 ±0.01	2.8 ±0.04	2.5 ±0.03	2.3 ±0.06	0.34 ±0.09	0.31 ±0.05	0.27 ±0.06	0.24 ±0.03	15.10 ±0.77	14.34 ±0.45	13.14 ±0.55	11.74 ±0.44
Grape	14.1 ±0.01	13.4 ±0.01	12.5 ±0.02	11.4 ±0.08	3.5 ±0.03	3.2 ±0.02	2.9 ±0.04	2.4 ±0.08	0.69 ±0.04	0.66 ±0.02	0.64 ±0.05	0.61 ±0.04	16.75 ±0.67	15.80 ±0.35	14.61 ±0.42	13.23 ±0.48
Pomegranae	10.8 ±0.2	9.6 ±0.05	8.9 ±0.05	7.2 ±0.07	3.01 ±0.06	2.8 ±0.02	2.5 ±0.07	2.3 ±0.05	0.97 ±0.06	0.96 ±0.05	0.93 ±0.02	0.91 ±0.08	18.96 ±0.32	17.92 ±0.23	16.72 ±0.31	15.22 ±0.36

The values are mean ± S.D. (n=3)

CONCLUSION

In the present study, total sugar (g/100ml), pH, acidity (g/100g), vitamin-C (mg/100ml) contents in fresh fruit juices orange, mango, apple, grape and pomegranate, decreases as time increases in hrs.

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