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COMPARATIVE STUDY OF PERCENTAGE OF CITRIC ACID AND TOTAL SOLUBLE SOLIDS IN NATURAL JUICES AND PACKAGED JUICES

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ABSTRACT:
Citrus fruits consist of naturally concentrated citric acid (2-hydroxy-1,2,3 propanetricarboxylic acid) i.e., weak acid. Fruit juices, because of their nutritive value, are consumed in various parts of India. In the present study, the percentage of citric acid and total soluble solids (TSS), were estimated in natural fruit juice and packaged fruit juice.

Keywords :- Citrus fruit juices, percentage of citric acid, total soluble solids [TSS].

INTRODUCTION :

Citric acid is a weak organic acid occurring naturally in many fruits, especially in citrus fruits, also found in animal fluids and tissue. It is very soluble and used as an additive in many drinks. The role of citric acid in drinks is to improve taste and flavor, act as an antioxidant and to maintain stability (preservative enhancement) [1-2]. Citric acid contains three carboxylic groups:2-hydroxy-1,2,3- propane tricarboxylic acid. In human physiological blood pH and urine, it is found mainly as the trivalent anion. Citrate salts are used to deliver minerals in biologically available forms, these include dietary supplements and medications. Citric acid is found to be the most concentrated in lemons and limes, as compared to other fruits [3]. Economically necessary plants during this cluster embody the lemon, limes, pineapple, kiwi, tomato. The peel or rind of the fruits is leather-like and decorated with oil glands. Thus, it is the foremost widely grown fruit, as a bunch of many species and is grown in almost 80 countries [4]. Citrus fruits have long been valued as a part of a nutritious and engaging diet. The flavor provided by citrus is among the most popular on the planet, and it is progressively evident that citrus not just solely tastes smart, however also is additionally sensible for us. It is well established that citrus and citrus products are a composite supply of vitamins, minerals, and dietary fiber (nonstarch polysaccharides) that are essential for traditional growth and development and overall nutritionary wellbeing. However, it is recently being appreciated that these and alternative biologically active, non-nutrient compounds found in citrus and alternative plants (phytochemicals) may facilitate cutting back the danger of many chronic diseases. Citrus fruits have long been the subjects of interest to medical sciences. For instance, it has been found to improve our immune system and digestion; brighten our skin; jumpstart our metabolism; fight infection. The production of ATP in the citric acid cycle is the major source of citric acid in vivo from endogenous metabolism in the mitochondria [5]. Annual international production of citrus fruits has witnessed robust growth and ascension in the recent decades from just about 30 million metric tons within the late 1960s [6] to complete estimate of over 150 million metric tons between 2000 and 2004, with oranges having the lion's share of almost half of the planet wide citrus production [7]. According to 2009 report of the Food and

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Agriculture Organization of the United Nation (FAO), China, Brazil, the U.S.A, India, Mexico, and Spain are the worlds' leading citrus fruit producing countries, representing nearly two-thirds of worldwide production [8]. In the United States, a complete of 9 to 10 million metric tonnes of citrus production was reportable for 2009 to 2010, with Florida constituting 65% becoming the leading state, California contributing 31%, followed by Texas and Arizona [9]. The modest increase in urinary citrate excretion has been associated with gastrointestinal absorption of citric acid from dietary source; citrate is the most abundant organic ion found in urine [10-11]. Many studies showed that intake of citric acid products leads to citrate excretion in urine. This may prevent stone formation by inhibiting the calcium oxalate nucleation process and the growth of both calcium oxalate and calcium phosphate stones. It also results in a reduction of the free calcium concentration in urine.

EXPERIMENTAL METHOD :

1. Determination of % of Citric Acid Content from Juices-

Citric acid percentage was determined by titrating fruit juices with 0.1N NaOH using phenolphthalein as an indicator. The percentage of Citric acid was determined from the following formula.

% of citric Acid = ml of NaoH x 0.064

2. Determination of Total Soluble Solids (TSS) from Juices-

Total Soluble Solids (TSS) from Juices can be determined by using formula –

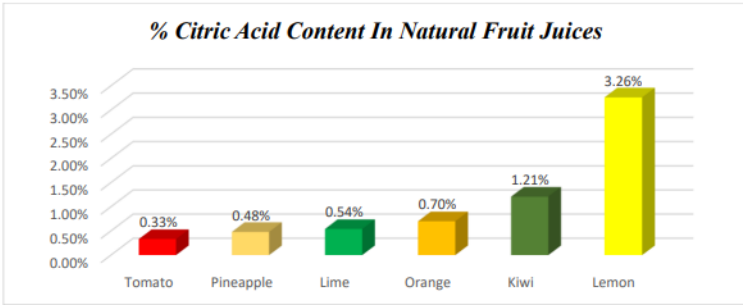
TSS = Brix value ÷ % of Citric Acid

Brix can be determined using Abbe's Refractometer.

Obsevations and Graphs.

1. % Citric Acid Content In Natural Fruit Juices:

Sr.no	Nameof Juice	Volume of Juice	Volume of NaOH	% of Citric Acid
1	Tomato Juice	10 ml	5.2ml	0.332%
2	Pineapple Juice	10 ml	7.6ml	0.486%
3	Lime Juice	10 ml	8.5ml	0.544%
4	Orange Juice	10 ml	11 ml	0.704%
5	Kiwi Juice	10 ml	19ml	1.216%
6	Lemon Juice	10 ml	51ml	3.264%



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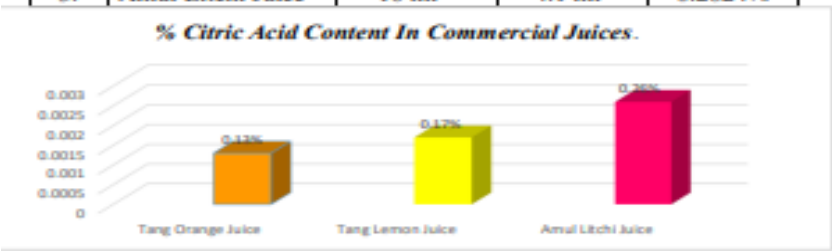
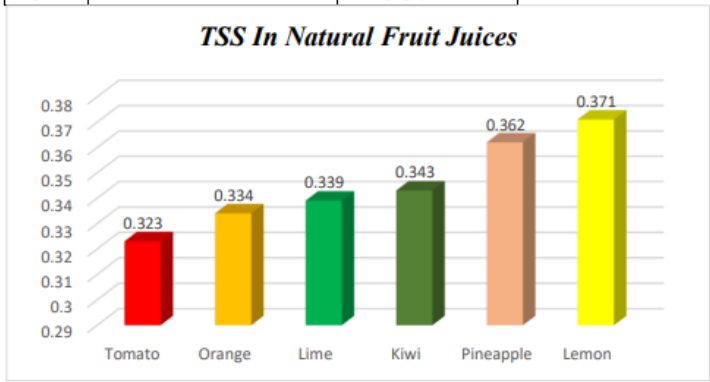
1. % Citric Acid Content In Commercial Fruit Juices:

Sr.no	Name of Juice	Volume of Juice	Volume of NaOH	% Citric Acid
1.	Tang Orange Juice	10 ml	2.1 ml	0.1344%
2.	Tang Lemon Juice	10 ml	2.8 ml	0.1792%
3.	Amul Litchi Juice	10 ml	4.1 ml	0.2624%



2. TSS (Total Soluble solids) in Natural Fruit Juices:-

Sr.no	Name of Juices	*Brix
1	Tomato Juice	0.323
2	Orange Juice	0.334
3	Lime Juice	0.339
4	Kiwi Juice	0.343
5	Pineapple Juice	0.362
6	Lemon Juice	0.371



RESULT AND DISSCUSION :

Plants in genus produce citrous fruits including crops like lemons, oranges, limes, grapes. In the present study, the percentage of citric acid and total soluble solids [TSS] were estimated. The percentage of citric acid was found to be the highest in natural lemon juice and the lowest in natural tomato juice. The percentage of citric acid was found in natural juice in increasing order i.e. tomato juice<pineapple juice<lime juice<orange juice<kiwi juice<lemon juice. The percentage of citric acid was less in packaged juices as compared to natural juices. Amul Litchi juice consists of high percentage of citric acid while orange juice consists of low percentage of citric acid. In natural juices, the total soluble solids [TSS] is highest in lemon juice while lowest in tomato juice. The increasing order of TSS is tomato juice<orange juice<lime juice<kiwi juice<pineapple juice<lemon juice. In packaged juice the TSS is low in Amul Litchi juice while high in Tang Lemon juice.

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