INTRODUCTION

The amino acid content of fruit and fruit-derived foods is studied intensely because of the contribution to nutritional value, aroma, taste and health-promoting effects. The fruit contains a wide range of nutritional and medicinal components, such as vitamins, minerals, amino acids, and polysaccharides [1]. It is believed to have valuable senescence-retarding and cancer-preventative effects [2]. Numerous functional foods and health care products for clinical applications have been developed from the fruit or its organic extracts. Recent studies show that some fruits contain a relatively high quantity of protein. This potential protein source has been indicated by the crude protein content of their edible portion [3]. Scarce work has been done to determine the protein quality, especially the amino acid content of several tropical fruits which paved way for the current study.

Fruits used in this study includes the following Apricot, Jamun, Dragonfruit, Pomegranate, Mangustan, Litchi, Jackfruit, Kiwi. Apricot (Prunus armeniaca) of the family rosacea is popular regulating blood pressure and cholesterol and abundance of vitamin A [4]. Jamun (Syzygium cumini L) is a polyembryonic species (family Myrtaceae) rich in anthocyanins and exhibits good antioxidant characteristics [5]. Dragonfruit (Hylocereus polyrhizus) from Latin America (Cactaceae family) is rich in vitamin C, calcium and phosphorus, and known for its fiber content [6]. The pomegranate (Punica granatum) an ancient, mystical, and highly distinctive fruit (Punicaceae family) has the potential therapeutic properties of treatment and prevention of cancer, cardiovascular disease, diabetes, dental conditions, and protection from ultraviolet (UV) radiation [7]. Mangostan (Garcinia mangostana L) (Hypercicaceae was alternatively known as Clusiaceae and Guttiferae) is a tropical evergreen tree, originated in the Sunda Islands is known for its high quantity of protein. This potential protein source has been indicated by the crude protein content of their edible portion [3]. Scarce work has been done to determine the protein quality, especially the amino acid content of several tropical fruits which paved way for the current study.

Fruits used in this study were collected from the local market and used for the study. 

Conclusion: It was evident that tropical fruits have a good balance of the essential amino acids (both raw and boiled form) which provide significant sources of protein in our diet.

Keywords: amino acids, nihydrin, apricot, jackfruit, Dragon fruit, Pomegranate, Mangustan, Litchi, Jamun, Kiwi

MATERIALS AND METHODS

Collection and preparation of the sample

The fruit samples apricot, jackfruit, pomegranate, litchi, mangustan, jamun, kiwi, dragon fruit were collected from the local market and used for the study. 

Preparation

Ten grams of fruits were washed thoroughly under tap water followed by distilled water and blotted on a blotting paper. Peel was removed, chopped and macerated using mortal and pestle with an equal volume of distilled water. Another sample was prepared by boiling the fruits under steam (10 g for 5 min).

Estimation of amino acids by nihydrin method

Nihydrin, a powerful oxidizing agent, decarboxylates the alpha- amino acids and yields an intensely colored bluish purple product which is colorimetrically measured at 570 nm.

Materials required

Nihydrin: 0.4 g of stannous chloride was dissolved in 250 ml of 0.2M citrate buffer (pH 5.0). This solution was then added to 10g of nihydrin in 250 ml of 2-methoxyethanol.

Diluents Solution: The diluent solution was prepared by mixing water and n-propanol.

Citrone Buffer: 0.2M Citrate buffer solution at pH 5.0 was prepared.

Leucin stock standard and working solution: 10 ml of the stock leucine solution was diluted to 100 ml with distilled water in a standard flask (1 ml of this solution contains 100µg leucine).

Procedure

Into a series of test tubes, 0.2, 0.4, 0.6, 0.8 and 1 ml of the working standard solution was pipetted out. In another set of test tubes, 0.2
ml, 0.4 ml and 0.6 ml of boil extract after centrifugation
was taken (supernatant used for assay). The volume in all the tubes
was made to 1 ml with distilled water. Then 1 ml of water served as
the blank. To all tubes, 1 ml of ninhydrin solution was added
including blank. The tubes were heated in a boiling water bath for
20 min after which 5 ml of diluent was added, mixed well and
incubated at room temperature for 15 min. The bluish purple colour
developed was read at 570 nm using a colorimeter. The amount of
amino acid present in the given sample was calculated using the
standard graph drawn by taking the O. D value in Y-axis and
concentration of amino acid in X-axis.

RESULTS AND DISCUSSION
Amino acids were estimated by Ninhydrin method for all the 8 fruits
as fresh samples and boiled samples and the results are have been
compared. Graph 1 shows 14.6 mg of amino acid presence in Apricot
and 32.5 mg for the boiled sample. In a similar study, it was
concluded that 33.3% of amino acids is present in the apricot juice
which is significantly higher compared to many other fruits [12]. In
the case of Jamun the raw fruit was significantly high at 78.6 and
boiled showed a value of 67 which was quite close. The content of
free amino acids changed during ripening and senescence of fruit and
Jamun contain a fair amount of amino acids [13]. Dragon fruit
had only half the amount of amino acids present in the raw sample
compared to Jamun which was 31.6, however, the boiled value
doubled to 62.2. Not much literature on the presence of amino acids
in dragon fruit, however, essential amino acid powder manufactured
from dragonfruit is commercially available which indicates the
feasibility of extraction of amino acids from the same [14]. Pomegranate was also low at 25.8 in the raw sample and 37.5 with
boiled fruit sample. Regarding individual amino acids, the total
glutamate, aspartate, pyruvate, and serine-related amino acids were
higher in the pomegranate juices compared to aromatic amino acids
[15]. Mangostan did not display any significant difference irrespective of raw (76 mg) or boiled (78 mg). Sixteen different
amino acids were found in Mangostan fruits, including γ-aminobutyric acid (GABA), alanine (ALA), isoleucine (ILE), valine
(VAL), and glycine (GLY) [16]. Litchi inspite of its water content
showed 39 mg of amino acids in the raw sample and 59 mg in the
boiled samples. Litchi contains several unusual amino acids disrupt
gluconeogenesis and β-oxidation of fatty acids. Seldom can these
amino acids be harmful to the human beings [16]. 794 mg/l of amino acids in litchi juice with more than 33 kinds of aroma compounds
were reported. Jackfruit was close to litchi with 33 mg in the raw
and 56.2 in the boiled samples. It was reported that jackfruit are rich
in lysine, has high contents of leucine and phenylalanine [17]. Kiwi
showed values close to pomegranate with raw samples at 27.9 mg
and the boiled samples showed a value of 34. In other studies also, it
was identified that kiwi was a rich source of proteins which clearly
indicates that it is made of rich sequence of 152 amino acids [18].

From the above study it is evident that for most of the values, the boiled
samples show a higher amount of amino acid content that the raw
samples amidst the tropical fruits used in this study. The limiting
essential amino acids in a food are determined by relating their
concentrations in that food to their concentrations in a reference protein.

CONCLUSION
It can be concluded that extensive research on amino acids in boiled
fruits and reason as to what increases the measure of the same
needs to be conducted. From the current study, it is evident that
unlike water soluble vitamins and other minerals which may lose its
potential on boiling is not the case with the chosen 8 tropical fruits.
Some of our fruits have a good balance of the essential amino acids
and they can provide significant sources of protein in our diet.

AUTHORS CONTRIBUTIONS
All the author have contributed equally

CONFLICT OF INTERESTS
Declare none

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Graph 1: Amount of aminoacids in different fruits
mangosteen plant (*Garcinia mangostana* L) using ultraviolet-visible detection. Rec Nat 2009;3:178.

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