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Nutritional Characteristics of the Pulp of the Fruit *Annona cherimola* Mill. and its Related Ethnomedicinal Properties

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Abstract

Annona squamosa and *Annona reticulata* are edible fruits which are normally grown in tropical countries. These have little or no ethnomedicinal values reported. However, *Annona cherimola* is also a tropical edible fruit and it has been grown on the slopes of Andes in the Latin American countries. Attempts have been made to successfully grow this on the plains of other tropical countries. The pulp of the fruit has tremendous radical scavenging activity as seen from the DPPH results of 258 ug/mL of the pulp. This means that the pulp of this fruit can be used as preventive medicine for boosting of immunity which in turn will help to check diseases like cancerous growth of cells. It will also help to control certain allergic manifestations especially involving the respiratory tract.

Keywords: *Nutrition; Antioxidants; Ethnomedicine; Annona cherimola*

Introduction

Annona cherimola (to be pronounced as cherimoya) is a fruit normally found in Latin American countries like Ecuador, Colombia, Peru and Bolivia. It normally grows on certain altitude and hence found on the slopes of Andes [1]. However, later on it was grown in most tropical regions like parts of South Eastern Asia including India [1]. The other species of *Annona* like *A. squamosa* and *A. reticulata* are already present and commonly gown in these regions. Cherimoya is a sweet fruit and much larger than *A. squamosa* or *A. reticulata*.

The skin of a ripe cherimoya fruit is green and gives in to slight pressure. Some characterize the fruit flavor as a blend of banana, pineapple, papaya, peach, and strawberry [2]. The fruit can be chilled and eaten with a spoon, which has earned it another nickname, the ice cream fruit. Indeed, in Peru, it is commonly used in ice creams and yogurt [3]. It has been found to be a good source of vitamin C, which being an antioxidant has several health benefits, including reduced risk of cardio-respiratory failure. However, like all members of the family Annonacea, the crushed seeds have small amount of a neurotoxic acetogenins, such as annonacin [4], which when ingested, showed symptoms of atypical Parkinson disease [5]. Extract of the bark of the tree can induce paralysis if injected [5].

Many local citizens (especially in many developing nations) use it as traditional medicines to cure many ailments commonly caused by viruses. In certain tribal areas the extract of the bark is use to coat the tips of arrows used in hunting small animals.

Nevertheless, this investigation was aimed to find out the nutritive values of the pulp of cherimola, keeping in mind the health benefits, as there are very stray and unorganized reports of such studies. Such detailed investigations have been carried out for pulps of *Annona squamosa* and *Annona reticulata* and the observations have been reported earlier [6].

Materials and Methods

The ripe fruits of cherimola were procured from the garden of one of the authors where he has been growing a couple of these trees.

The pulp was extracted with ether followed by petroleum ether to reduce the fat content to less than 1%. This was then subjected by boiling at 35°C initially and then at 52°C for an hour to remove all solvents. Such an extract was stored in a closed bottle for further use unless otherwise stated.

Crude fiber content

The procedure of determining crude fiber content was as per the method of AOAC (2000) [7,8] where 2g of samples were treated with boiling 0.25N H_2SO_4 solution to remove all acid soluble minerals; neutralizing by washing with demineralized water followed by washing with boiling 0.32N NaOH solution to remove all alkali soluble substances. The residue was washed with water followed by boiling H_2SO_4 solution in ethanol-water mixture. This was then dried and ignited at 600°C and the ash content determined. The crude fiber content was then calculated accordingly.

Total carbohydrate content

This was done by acid hydrolyzing the polysaccharides into monosaccharides and the total monosaccharides were determined by anthrone method of AOAC (2000) [7,9]. The fat free extract (100 mg) was treated with 2.5N HCl by boiling for 3 hrs. The solution was cooled to ambient temperature and the acid was neutralized by sodium carbonate. The volume was made to 100 mL. The solution was then centrifuged at 8944 x g for 10 minutes. to remove all insoluble matter. The clear supernatant (0.5 mL to 1 mL) was used for analysis and the total carbohydrate content determined using the standard calibration curve.

Reducing sugar content

This was done using the dinitrosalicylic acid method [10]. The most important part is to extract the reducing sugars by treating 100 mg of the sample with hot 5 mL of 80% ethanol (twice). The supernatant was then dried over water bath at 80oC to complete dryness. The dried mass was then dissolved in 10 mL of water. This was then used for estimation of the reducing sugar by taking 0.5 mL to 3.0 mL of the solution. The reducing sugar was determined using standard calibration curve of glucose by this method.

Starch content

This too was done by anthrone reagent method [9]. Here, first of all 0.5g of sample was washed several times with hot 80% ethanol till the washings did not give any color with anthrone reagent. The residue was then treated with 0.5 mL of deionized water and 6.5 mL of 52% perchloric acid. The mixture was allowed to stand at 0°C for 20 minutes. The procedure was repeated several times till 100mL of solution was obtained. Out of this solution 0.2 mL was taken in a volumetric flask and the volume was made to 1 mL using deionized water. To this was added 4 mL of anthrone reagent and heated in boiling water bath for 8 minutes. The solution was cooled and the absorbance was recorded in a spectrophotometer. The sugar content was estimated from standard calibration curve. The starch content was deduced accordingly from this.

Protein content

This was done by Biuret method [11]. The sample (5 mL) was taken in 10 mL of 0.25M phosphate buffer of pH 7. The sample was shaken vigorously in a vortex mixture for 10 minutes to dissolve proteins (as much as possible). This was then centrifuged to remove all insoluble parts and 2.5 mL of the clear supernatant was used for further estimation. The protein content was determined from a standard calibration curve.

Lignin content

This is also called as acid detergent lignin quantification [12]. Here the sample is first treated with 72% H2SO4 for 3 hrs. This is then thoroughly washed with demineralized water to remove all acid. It is then dried and ignited at 550oC to get ash. The lignin content is then calculated from this.

Saponification value

Here the 4g to 5g sample (moisture free) is taken preferably dissolved in just sufficient amount of absolute ethanol. All insoluble matter is removed by filtration. It is then treated with 50 mL KOH. The residual KOH is estimated with HCl. The saponification value is calculated accordingly [13].

DPPH Radical Scavenging Assay

Sample (1.0 mL) was treated with 0.5 mL of methanolic DPPH (2,2 diphenyl-1-1-picrylhydrazyl) solution along with reagent control and the absorbance was measured at 517 nm. The Radical Scavenging ability was then calculated appropriately.

Moisture content of the pulp of the fruit and the subsequent ash content were also determined following standard procedure of AOAC (2000) [7].

Results and Discussion

It has been stated earlier that the pulp of the fruit - *Annona cherimola* has not been studied except for some stray reports. The results of this study are as shown in table 1.

Sr. No.	Test	Observation
1	Crude fiber content	8%
2	Total carbohydrate content	81.33 mg / mL
3	Reducing sugar content	30 mg/mL
4	Starch content	36.05 mg/mL
5	Protein content	30.01 mg/mL
6	Lignin content	12%
7	Saponification value	3.08
8	DPPH Radical scavenging ability	258.06 µg/mL
9	Moisture content (of a very ripe fruit)	86%
10	Ash content	24.3%

Table 1: *Results of various analysis of the pulp of the fruit Annona cherimola.*

It can be seen from the above results that the pulp of *Annona cherimola* is pretty similar to the pulp of *Annona squamosa* and *Annona reticulata* except for the radical scavenging activity which is very high as compared to that of the pulp of *A. squamosa* and *A. reticulate* (157 µg/mL) [14].

Conclusion

The high radical scavenging activity of the pulp of Annona cherimola is the reason for it being consumed as a preventive measure for many diseases like cancer, certain immunological disorders, brocho-pneumonia, certain cardio-respiratory diseases and also certain common ailments like allergic common cold, allergic asthma etc. In many developing nations the pulp of this fruit is used as traditional medicine for increasing the immunological resistance power of the body against certain viral diseases like those caused by PAPOVA and Rhino viruses. In many such nations it is also believed by certain tribal people that regular consumption can also increase the longevity of the life of people (may be by slowing down the ageing process).

Conflict of Interest

There is no conflict of interest or financial interest by any of the authors.

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