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RESEARCH ARTICLE

Determination of Tannins Content by Titrimetric Method for Comparison of Different Fruit Species

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ABSTRACT

Tannins characterize various compounds that include in fruits and vegetables of different plant species. Tannins are also known as proanthocyanidins possessing useful properties such as antioxidant, anti-apoptosis, anti-aging, anti-carcinogenic, anti-inflammatory as well as anti-atherosclerosis and cardiovascular protection. The purpose of present study was to determine the tannin content by titrimetric method for comparison of different fruits such as apple, banana and strawberry. It was found that tannin content was lower in banana peel and strawberry as compare to apple.

Keywords: Tannins, Fruits, Extract, Titrimetric method.

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CONTENTS

1. Introduction	124
2. Materials and Methods	125
3. Results and Discussion.	125
4. Conclusion.	126
5. Acknowledgement.	126
5. References	126

1. Introduction

The name 'tannin' is derived from the French 'tanin' (tanning substance) and is used for a range of natural polyphenols. Since ancient times it is known that certain organic substances have tanning properties and are able to tan animal skins to form leather. Prehistoric tribes already knew about the tanning of protective animal hides with brain material and the fat of the killed animals [1,2]. However, precisely what happens to the skin during the

tanning process was only elucidated during the twentieth century with the help of modern analytical techniques. Real tanning is understood as the cross linking of the skin's collagen chains, while false tanning entails the filling of hollow spaces between the skin's collagen chains [3,4]. The traditional tanning of animal skins by means of plant tannins has been replaced gradually by mineral tanning, as represented by alum tanning (or glacé tanning, a variant of

alum tanning) and more recently, since the end of the nineteenth century, by chromium tanning [5]. In nature the tannins are found worldwide in many different families of the higher plants such as in chestnut and oak wood, Divi-Divi, Sumach, Myrobalaen, Trillo, Valonea or plant galls; depending on their origin, their chemistry varies widely, having a molar mass of up to 20000 D. High tannin concentrations are found in nearly every part [6].

The word phenol is extremely recent and reflects a standard technology. "Tanning"(water proofing and preserving) was the word wont to describe the method of remodeling animal hides into leather by exploitation plant extracts from completely different plant components of various plant species. Plant parts containing tannins include bark, wood, fruit, fruit pods, leaves, roots, and plant galls. The term "tannin" was used to describe substances in vegetable extracts used for changing animal skins into stable leather [7,8]. Tannins as well broadly action in accepted aliment such as cashew nut, hazelnut, walnut, banana, strawberry, raspberry, blackberry, grape, and mango and so on. Vegetable tannins can be classified into hydrolysable and nonhydrolysable, getting tannic acerbic the alot of adumbrative hydrolyzable tannins [9,10].

Tannins accredit to the assorted accumulation of actinic compounds in wine that may accept an after effect the color, crumbling adeptness and arrangement of the wine. Whereas tannins cannot be smelled or tasted, they can be perceived during wine tasting by the concrete dehydration awareness and faculty of acerbity that they can leave in the mouth [11,12]. This is due to the addiction of tannins to acknowledge with proteins, such as the ones begin in saliva. In aliment and wine pairing, foods that are top in proteins (such as red meat) are generally commutual with tannic wines to abbreviate the acidity of tannins. However, abounding wine drinkers apprehend the acumen of tannins to be a absolute trait-especially because it relates to mouth feel [13,14].

The administration of tannins in the winemaking action may be a key allotment within the after quality. Fermenting with the stem, seeds and derma will access the tannin agreeable of the wine. abstraction in wine assembly and burning has apparent that tannins, in the anatomy of proanthocyanidins, accept a benign aftereffect on vascular health [15,16]. The abstraction showed that tannins suppressed assembly of the peptide amenable for hardening arteries. To abutment their findings, the abstraction aswell credibility out that wines from the regions of southwest France and Sardinia are decidedly affluent in proanthocyanidins, and that these regions aswell aftermath populations with best activity spans [17,18]. Reactions of tannins with the phenolic admixture anthocyanidins creates addition chic of tannins accepted as bistered tannins which influences the blush of red wine. Commercial affairs of tannins, accepted as enological tannins, fabricated from oak wood, grape berry and skin, bulbgall, chestnut, quebracho, gambier and myrobalan fruits, can be added at altered stages of the wine assembly to advance blush durability.

2. Materials and Methods

2.1.1 Banana Peel

Sample Collection and Preparation

The banana peels used for the investigation were obtained from bananas bought from Uselu market, Benin City, Nigeria. They were air-dried for two weeks and ground into powder with a mechanical blender and sieved with a mesh of size 0.50mm. The powdered samples obtained were thereafter stored in clean brown bottles at room temperature ($28\pm 2^\circ\text{C}$) until needed for use [19].

Preparation of Aqueous and Ethanol Extract

Ninety (90) grams of the powdered peels was dispensed in 900ml of distilled water in a 1L capacity conical flask. The mixture was stirred vigorously intermitently with a magnetic stirrer and then allowed to stand for 48h. It was stirred again and filtered through a Whatman filter paper lined funnel into a conical flask. The filtrate was evaporated at 40°C with a water bath to obtain the solid crude extract. The same procedure was carried out for ethanol extraction except that the crude solid extract was obtained by concentrating the filtrate with a rotary evaporator. All extracts obtained were stored in a refrigerator until required for use.

Phytochemical Analysis: The extracts of *Musa sapientum* peels were analyzed for alkaloids, tannins, glycosides, steroids, flavonoids, saponins, volatile oil and resins using standard procedures [20].

Test for Tannins

Two drops of 5% FeCl_3 was added to 1ml of the plant extract. The appearance of a dirty-green precipitate indicated the presence of tannins (and Evans, 1996)

2.1.2 Strawberry

Sample preparation

3 g of the studied food product was extracted with distilled water into 250 ml volumetric flask during 4 hours at room temperature and then the sample was filtered [21,22].

2.1.3 Apple Fruit

Preparation of Fruit Extracts

Samples of these three (3) apples were collected from the refrigerator, rinsed with distilled water and dried using Whatman number 1 filter paper. These were cut into pieces with a sterile knife and blended in a Panasonic blender of model MX- 337N. Their aqueous extracts were obtained, filtered and stored in clean sample containers in the refrigerator until needed for analysis [23].

Test for Tannins

Aqueous extract (2 ml) was mixed with 2 ml of water before the addition of about 1 to 2 drops of diluted ferric chloride solution. A dark green or blue green coloration was regarded as positive for the presence of tannins [24].

3. Results and Discussion

The results of preparation and standardization of 0.1N KMnO_4 presented in Table 1. Percent tannin content in both aqueous and methanolic extract are presented in Table 2. Fig. 1 represented the percent tannin content in marketed product of fruits. It was found that samples of methanolic extract of apple and banana contain higher amount of tannins than their aqueous extract.

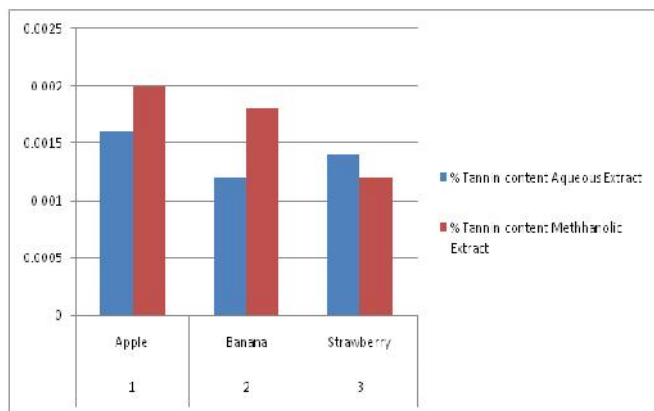


Figure 1: Percent tannin content in marketed product of fruits

4. Conclusion

Tannin is an astringent, polyphenolic biomolecular that bind to and precipitates protein and various other organic compound including amino acids and alkaloids. The analysis of tannins content in various fruits was performed according to the International Pharmacopoeia and AOAC method after some modifications. It was found that in case of various fruits tannin contents is correlated in methanol and aqueous solvent. In the aqueous tannin contents are not much higher than those in methanol, tannin content. The analysis of tannins content is performed by using titrimetric method of different marketed product of fruits. It was found that tannin content was lower in banana peel and strawberry as compare to apple.

Table 1: Preparation and standardization of 0.1N KMnO4

S. No.	Volume of sodium oxalate	Burette Reading			Average
		Initial	Final	Difference	
1	20ml	0	14.3	14.3	12.86
2	20ml	14.3	26.9	12.6	
3	20ml	26.9	38.6	11.7	

Calculation

$$\begin{aligned}
 N_1V_1 &= N_2V_2 \\
 V_1 \times 20 &= 0.1 \times 12.86 \\
 N_1 &= \frac{0.1 \times 12.86}{200} \\
 N_1 &= 0.06N
 \end{aligned}$$

Assay Calculation

Formula $T(\%) = \frac{(V-V_0) \times 0.004157 \times 250 \times 100}{g \times 25}$

Where as

0.004157 = tannin Equilibrium in 1 ml of 0.1N aqueous solution of KMnO4
 250 ml Volumetric flask
 V = 0.1N aqueous solution of KMnO4
 V₀ = 0.1N aqueous solution of blank sample
 g = No. of sample taken for analysis

Table 2: Percent tannin content in both aqueous and methanolic extract

S.No.	Sample	% Tannin content	
		Aqueous Extract	Methhanolic Extract
1	Apple	0.0016	0.0020
2	Banana	0.0012	0.0018
3	Strawberry	0.0014	0.0012

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