PHYTOCHEMICAL SCREENING OF ORANGE PEEL AND PULP

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Abstract

The oranges were purchased from the local market of Bela. The orange peel and pulp were subjected to successive extraction with solvents in increasing order of their polarity viz. Acetone, hexane, methanol and distilled water. Orange peel and pulp powder was extracted separately by aqueous extraction. Phytochemical analysis indicated the presence of tannins, saponins etc. Anthraquiones were completely absent in both the citrus peel and pulp.

Keywords: *orange, alkaloids, anthraquinones, saponins.*

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1. INTRODUCTION

Citrus fruits are mainly used by juice processing industries while the peels are generally wasted in the industries. Since the juice yield of citrus is less half of the fruit weight. A very large amount of oranges byproduct wastes, such as peels which are formed every year [1]. From waste materials, there is always an increased attention in bringing useful products and citrus wastes are no exceptions. Suitable methods have to be adopted to utilize orange peel and pulp for the conversion into value-added products [2]. Environmental pollution can also be reduced. The citrus peels are rich in nutrients and contain many phytochemicals; they also can be efficiently used as drugs or as food supplements. There is an increase in the number of antibiotic resistance pathogens, there is always a search of an alternative drug that is regarded as safe [3], [4], [5].

A Pulp and their seed contribute to bulk of the fruit weight comprising about 46% and 44% while peel constitutes about 10%. The orange fruit is highly nutritious and rich in minerals, proteins, carbohydrates, and fat [6].

Orange juices are a rich source of Vit. C which is considered as a most important water- soluble antioxidant. The major role of Vit C is the prevention of scurvy; this causes the disease which leads to the formation of spots on the skin, spongy gums and bleeding from the mucous membranes. Vit. C is unstable compounds which are degraded by both aerobic and anaerobic pathways. The loss of Vit C might be a critical factor for the shelf life of some products as citrus juice concentrates [7].

2. MATERIAL AND METHOD

2.1. Collection of material

Fresh orange were collected from in the local market in the month of May 2013. The orange were washed well using tap water .The peel is separated , then the pulp of Orange was separated by cutting them into small pieces and peel is also cut into small pieces then it was dried in oven for a period of 6-7 days, at an ambient temperature of 30˚C. The dried samples were grinded properly using a mortar and pestle and later using a grinder, to obtain the powdered form. The powder of the peels and the pulps were stored separately in air tight bottles.

3. PREPARATION OF EXTRACTS

3.1. Soxhlet Extraction

Orange fruits were washed by distilled water then peeled and their edible portions were carefully separated. The peels were air dried in a ventilated oven at 40°C for 48 h and ground to a fine powder and passed through a 24-mesh sieve according to the method described by Van-Acker *et al.* 100g powdered sample was extracted with either 800ml ethanol or methanol or dichloromethane or acetone or hexane or ethyl acetate at

room temperature by Soxhelt extraction method for 6 h. The mixture filtered through a Whatman No. 2 filter paper for removal of peel particles. The residue was re-extracted twice under the same condition to ensure complete extraction. The extracts were filtered and evaporated to dryness under reduced pressure at 60°C by a rotary evaporator. The extracts were placed in dark bottles and stored in refrigerator at 4°C until use. [8].

3.2. Aqueous Extraction

The method of was adopted [8] for extraction with little modification. Briefly, 15g of the powdered plant were soaked separately in 200 ml of distilled water at room temperature for 24 hour under shaking condition. The extract was then filtered using Whatman filter paper No.1 then concentrated to dryness by using the water bath at 70ºc. Yield of the extract is weighed on the weighing balance (shimadzu). Each extract were transferred to glass vials and kept at 4º C before use.

4. PRELIMINARY PHYTOCHEMICAL ANALYSIS (QUALITATIVE ANALYSIS)

The powered plant parts as well as the extracts were subjected to preliminary phytochemical screening following the methodology of [5].

1**. Test for alkoloids:** 2 ml filtrate was mixed with 1% HCl and about 6 drops of Mayor's reagents. A Creamish or pale yellow precipitate indicated the presence of respective alkaloids.

2. **Test for amino acids:** 1 ml of the extract was treated with few drops of Ninhydrin reagent. Appearance of purple color shows the presence of amino acids.

3. **Test for tannins:** 1 ml of the extract was treated with few drops of 0.1% ferric chloride and observed for brownish green or a blue-black coloration.

4. **Test for anthraquinones (Borntrager's test):** 1 ml of the extract solution was hydrolyzed with diluted Conc. H_2SO_4 extracted with benzene. 1 ml of dilute ammonia was added to it. Rose pink coloration suggested the positive response for anthraquinones.

5. **Test for saponins:** Froth test for saponins was used. 1g of the sample was weighed into a conical flask in which 10ml of sterile distilled water was added and boiled for 5 min. The mixture was filtered and 2.5ml of the filtrate was added to 10ml of sterile distilled water in a test tube. The test tube was stopped for about 30 second. It was then allowed to stand for half an hour. Honeycomb froth indicated the presence of saponins.

6. **Test for protein:** 3 ml sample of each extract was treated with 4% Sodium Hydroxide and few drops of 1% Copper Sulphate was added. Te violet or pink colour apper the presence of protein.

7**. Test for terpenoids (Salkowski test)**: 5 ml of each extract was mixed in 2 ml of chloroform, and concentrated H_2SO_4 (3 ml) was carefully added to form a layer. A reddish brown coloration of the inter face was formed to show positive results for the presence of terpenoids.

8. **Test for cardiac glycosides (Keller-Killani test):** 5 ml of each extracts was treated with 2 ml of glacial acetic acid containing one drop of ferric chloride solution. This was underlayed with 1 ml of concentrated sulphuric acid. A brown ring of the interface indicates a deoxysugar characteristic of cardenolides.

5. RESULTS

The soxhlet extract of the citrus peel using different solvents yielded different results in each of the experiment conducted in the this study. There existed, a difference in the percentage yield of the extract obtained between various solvents. Yield of extract obtained after dried the extract of various sample like Acetone, Methanol, Hexane and Distilled water by the Soxhlet apparatus of peel and pulp and the aqueous extraction.

Table 1: Yield in gms. of peel extract by soxhlet apparatus

Solvent used according to their Polarity	Yield (sample 100gm.)
Acetone	1.5g
Methanol	60.6g
Hexane	1.2g
Distilled water	12.7g

Table 2: Yield in gms of pulp extract by soxhlet apparatus

Solvent used according to their polarity	Yield (sample 100gm.)
Acetone	4.8g
Methanol	19g
Hexane	2.7g
Distilled water	2.3g

Table 3: Yield of peel and pulp by aqueous extraction

Peel /100g	2.6g
Pulp/100g	2.1g

6. PRELIMINARY PHYTOCHEMICAL ANALYSIS

The preliminary phytochemcial investigation revealed the presence of various constituents of citrus peels and pulp. The results are shown in the table. Different solvent showed different class of phytochemicals .They showed the presence of tannins, saponins etc. antraquiones were completely absent in both the citrus peel and pulp. These constituents could account for the antibacterial activity but it is difficult to correlate their action to a specific phytochemical.

Table4: Phytochemical analysis of orange peel and pulp by soxhlet apparatus

Phytochemicals	Acetone		Hexane		Methanol		Distilled water	
	Peel	Pulp	Peel	Pulp	Peel	Pulp	Peel	pulp
Alkaloids	-	-	+	+	+	-	+	-
Amino acid	-	-	-	-	-	-	-	-
Tannin	+	+	+	+	+	+	+	+
Anthraquinones	-	-	-	-	-	-	-	-
Saphonins	+	-	-	-	-	+	+	+
Protein	-	-	-	-	-	-	-	-
Terpenoids	-	-	+	+	+	+	-	+
Cardic glycosides	-	+	+	+	-	+	+	-

Table 5: Phytochemical analysis of orange peel and pulp by aqueous extraction

Phytochemicals	Peel	Pulp
Alkoloids	+	-
Amino acid	-	-
Tannin	+	+
Anthraquinonins	-	-
Saphonins	+	+
Protein	-	-
Terpenoids	-	+
Cardic glycosides	-	-

7. CONCLUSION

Phytochemical analysis indicated the presence of tannins, saponins etc. antraquiones were completely absent in both the citrus peel and pulp. This study was aimed to focus on waste minimization in fruit juice processing industry. The combined efforts of waste minimization during the production process and recovery of valuable product which reduces the amount of waste, as well as boost the environmental profile of fruit juice processing industry. The oranges pulp has the medicinal value which lies in bioactive phytochemical that produce definite physiological action on the human body. The Alkaloid and glycoside components of the fruit possessing can be show the anticancer activity which can be further used as drug supplement. Recycling of fruit waste is one of the most important means of utilizing it in a number of innovative ways yielding new products and meeting the requirements of essential products required in human, animal and plant nutrition as well as in the pharmaceutical industry.

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