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Preliminary Phytochemical and Mineral Analysis in Therapeutic Fruit Peels of Banana, Orange and Pomegranate

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Abstract: *The study aimed to evaluate the phytochemical content, mineral analysis and uses of Banana, Orange and Pomegranate peels. The extraction of Banana, Orange and Pomegranate peels with solvents: ethanol, chloroform and water were carried out. The mineral values were given. Phytochemical analysis of Banana peel contains carbohydrate, protein, starch, amino acid, glycosides, flavonoids, alkaloids and phenols. In Orange peel carbohydrates, protein, starch, amino acid, glycosides, flavonoids, alkaloids and phenols were present. The Pomegranate peel contains carbohydrate, protein, starch, amino acid, steroids, flavonoids, saponin, terpenoids and phenols. The mineral profile shows the high values of Pomegranate peels than the banana and orange peels.*

Keywords: *Banana, Orange, Pomegranate, peels, phytochemical, minerals.*

I. INTRODUCTION

India is the second largest producer of fruits in the world, falling behind China and is regarded as the largest producer of Mango, Jackfruit, Banana, Papaya, Sapota and Pomegranate. About 30 percent of the world's Banana is producing in the country. India ranks at number one slot in the world's highest Banana producing country. India produces around 29 lakh tonnes of Orange every year. The total area under cultivation of Pomegranate in India is 107.00 thousand tonnes.

Fruits after consumption leave a peel which is a nuisance to the environment as a solid waste. But the fruit peels have a many nutrients values. The fruit peels are used as a substrate for bioactive compounds, phenolic antioxidants, organic acids, enzymes, biofertilizer, production of energy and as absorbents. Peel also known as a rind or skin, is the outer productive layer of a fruit or vegetable which can be peeled off. A fruit with a thick peel is called a hesperidium. In hesperidia, the inner layer is peeled off together with the outer layer. The inner layer and outer layer, respectively are the exocarp and mesocarp. The juicy layer inside the peel is the endocarp.

The banana is most widely distributed and consumed fruit in the world. The peel which products the banana fruit banana fruit is discarded as waste after the inner flesh portion is eaten and possess an environmental problem due to it nitrogen and phosphorus quantity. Banana and plantain peels are major agricultural wastes which have been use as medicine, animal feed, blacking of leathers, soap making, fillers in rubber and so on. (Velumani, 2016).

The orange is originating from Asia. Every year a large amount of orange byproducts waster are formed such as peels. It is rich in nutrients and contains many phytochemicals therefore. It is used in many drugs and food items. Concerning with the orange peels, they provide 16% to 19% of the fruit weight. Some investigation on the composition in macro and micronutrients allowed according of several therapeutic and nutritional virtues of the orange peels (SuryawanshiJyotsnaSaonera, 2011).

Pomegranate is one of the important and oldest edible fruits of tropical and subtropical regions, which originated in the Middle East. Pomegranate peels are exploited traditional medicine because of their strong astringency, making them a popular remedy throughout the world. In the form of an aqueous decoction, it was used for dysentery, diarrhea and also for stomatitis. It can be drunk and used as a mouthwash, douche or enema (Lansky *et al.*, 2004).The current study aimed to find out the minerals and preliminary phytochemicals in the peels of Banana, Orange and Pomegranate

II. MATERIALS AND METHODS

Banana, orange and pomegranate fruits were purchased from Vadavalli market, Coimbatore. The peels were separated from fresh fruits and washed with running tap water and distilled water. Then the peels were cut into small pieces and spread on newspaper to remove the excess water. Then the peels were shade dried, powdered and stored in air tight container for further analysis. The preliminary phytochemicals and mineral analysis were done using standard methods.

III. RESULTS AND DISCUSSION

In Banana carbohydrate, protein, starch, amino acid, glycosides, flavonoids, alkaloids, saponins, terpenoids and phenols were observed in all the three solvent extracts. Carbohydrates, protein, starch, amino acid, glycosides, flavonoids, alkaloids, saponins, terpenoids and phenols were observed in both ethanol and chloroform extracts. Steroids and gums were totally absent in all the three solvent extracts of banana peel. Tannin was observe in ethanol and water extracts.

The phytochemical analysis of aqueous and organic solvent extracts of banana peel (*Musa paradisiaca*) reveal the presence of alkaloids, flavonoids, carbohydrates, protein, tannin, terpenoid, saponins, glucosides and anthroquiones. In orange among the three solvents extracts showed the presence of carbohydrates, protein, steroids, glycosides, flavonoids, alkaloids and phenol were present. Terpenoids and gums were completely absent in all the three solvents. Starch and tannin were present in two solvents except chloroform. Amino acid and glycosides were present in two solvents extracts ethanol. In Pomegranate, among the three solvents showed the presence of carbohydrates, protein, starch, amino acid, steroid, flavonoids, alkaloids, saponin, terpenoids and phenol were present in both ethanol and chloroform extracts. Gum was totally absent in three solvents extracts. Glycoside was absent in both ethanol and chloroform. Alkaloid was present in two solvent extracts except ethanol.

Carbohydrates help to break down of fatty acid and preventing ketosis. Proteins are important building blocks of bones, muscles, cartilage, skin and blood. Starch used as a thickening, stiffening or gluing agent. Steroids used to treat a variety of inflammatory diseases and conditions. Flavonoids have antiviral and anticancer property. Alkaloids used in medicines, pesticides and insect repellents. Saponins reduce the risk of cancer. Terpenoids greatly expand the variety of aromas used in perfumery and flavors used in food additives. Phenols are used as intermediates for industry synthesis.

IV. CONCLUSION

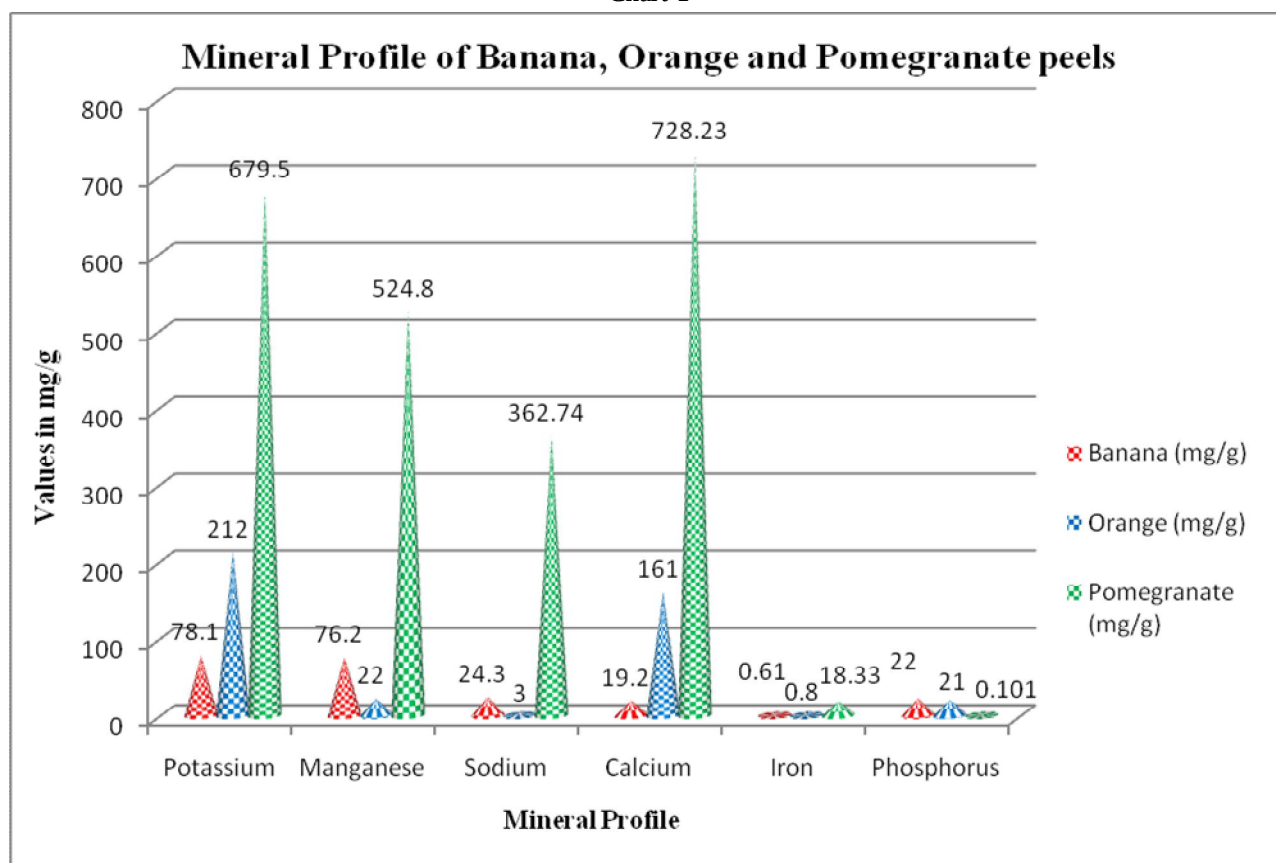
Phytochemical analysis on banana peel revealed the presence of carbohydrates, protein, starch, amino acid, glycosides, flavonoids, alkaloids, saponin, terpenoids and phenol in all solvents extracts i.e. ethanol, chloroform and water. In the case of orange peel, it showed the presence of carbohydrates, protein, steroids, flavonoids, alkaloids and phenol in all solvents extracts. In pomegranate peel contain the carbohydrate, protein, starch, amino acid, steroids, flavonoids, saponin, terpenoids and phenol in ethanol, chloroform and water extracts. Comparative analysis of these three selected plants revealed the presence of carbohydrates, protein, flavonoids and phenols. The mineral values of the pomegranate peels have high amount of mineral profile except phosphorus content. The banana peels contain high level of phosphorus. The peel of Pomegranate has the high mineral values then the banana and orange peels except phosphorus (Chart -1). The present study on the secondary metabolites in the peels will have way to discover new drugs. They are important for our quality, healthy and disease free life.

TABLE-1 Phytochemical Screenings of Peelings of Banana, Orange and Pomegranate

S. NO	Phytochemical constituents	BANANA			ORANGE			POMEGRANATE		
		Ethanol	Chloroform	Water	Ethanol	Chloroform	Water	Ethanol	Chloroform	Water
1	Carbohydrate	+	+	+	+	+	+	+	+	+
2	Protein	+	+	+	+	+	+	+	+	+
3	Starch	+	+	+	+	—	+	+	+	+
4	Amino acid	+	+	+	+	+	—	+	+	+
5	Steroids	—	—	—	+	+	+	+	+	+
6	Glycosides	+	+	+	+	+	—	—	—	+
7	Flavonoids	+	+	+	+	+	+	+	+	+
8	Alkaloids	+	+	+	+	+	+	+	—	+
9	Tannin	+	—	+	+	—	+	—	+	+
10	Saponin	+	+	+	+	—	+	+	+	+
11	Terpenoids	+	+	+	—	—	—	+	+	+
12	Gum	—	—	—	—	—	—	—	—	—
13	Phenol	+	+	+	+	+	+	+	+	+

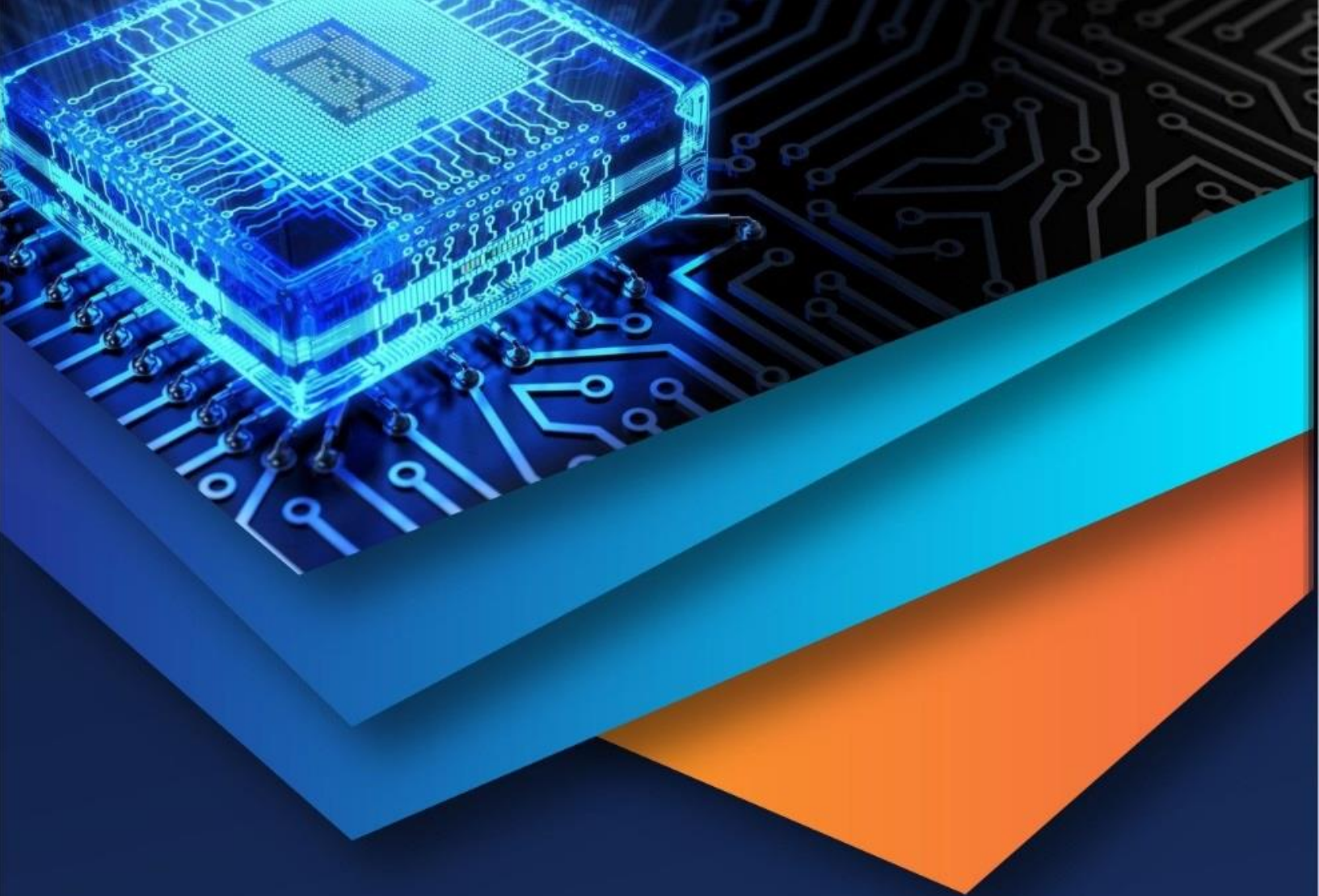
+ = Present; - = Absent

Chart-1



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