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Phytochemical Composition of Cabinet Dried Fruit Proportions

D. Jancy Rani[a*] and Dr.S.S. Vijayanchali[b]

Research Scholar, Department of Home science, The Gandhigram Rural Institute (Deemed to be university), Gadhigram, Dindigul, Tamilnadu.

Associate Professor & Head, Department of Home science, The Gandhigram Rural Institute (Deemed to be university), Gadhigram, Dindigul, Tamilnadu.

Abstract

Phytochemicals are naturally occurring in the medicinal plants leaves, stem bark, fruits and roots that have defense mechanism and protect us from various diseases. A medicinal plant is any plant which, in one or more of its organs, contains substances that can be used for therapeutic purposes, or which are precursors for chemo-pharmaceutical semi synthesis. Such a plant will have its parts including leaves, roots, rhizomes, stems, barks, flowers, fruits, grains or seeds, employed in the control or treatment of a disease condition and therefore contains chemical components that are medically active. They synthesis large variety of chemical substances known as secondary metabolites which include alkaloids, steroids, flavonoids, terpenoids, glycoside, saponia, tannins, phenolic compounds etc. the active principle of many drugs found in plants are secondary metabolites. The objective of the present study was to screen and quantify the phytochemicals present in various proportions of skin, pulp and seeds cabinet dried fruits such as Tomato, Pink Guava, Grapes and Watermelon. Preliminary qualitative phytochemical analysis was carried out by the standard procedures to identify the secondary metabolites like alkaloids, flavonoids, phenol, saponin, tannin, terpenoids, quinons, phlobatannin and steroids. Quantitative phytochemical test such as Alkaloids, Flavonoids and Total Phenol were also done. Tests were in triplicates and the results were interpreted in tables. It can be concluded that the cabinet dried pink guava pulp followed by watermelon pulp, grapes seed and tomato skin has the abundant quality of photochemical.

Key Words: Phytochemical, Chemo-pharmaceutical, Secondary metabolites

INTRODUCTION

Phytochemicals generally originated from the plant source are nothing but the bioactive compounds also known as secondary metabolites. There are two types of metabolites produced in plants viz. Primary metabolites and Secondary metabolites. Primary metabolites are important for the plants regular metabolism such as growth and development. Secondary metabolites produced by plants may have little need for them. These are synthesized in almost all parts of the plant like bark, leaves, stem, root, flower, fruits, seeds, etc. More than 4,000 phytochemicals have been cataloged and are classified by protective function, physical characteristics and chemical characteristics and about 150 phytochemicals have been studied in detailed. In wide-range dietary phytochemicals are found in fruits, vegetables, legumes, whole grains, nuts, seeds, fungi, herbs and spices. Broccoli, cabbage, carrots, onions, garlic, whole wheat bread, tomatoes, grapes, cherries, strawberries, raspberries, beans, legumes, and soy foods are common sources (Saxena et al, 2013). Recently, it is clearly known that they have roles in the protection of human health, when their dietary intake is significant. High concentrations of phytochemicals, which may protect against free radical damage, accumulate in fruits and vegetables. Plants containing beneficial phytochemicals may supplement the needs of the human body by acting as natural antioxidants. Various studies have shown that many plants are rich source of antioxidants. For instance, vitamins A, C, E, and phenolic compounds such as flavonoids, tannins, and lignins, found in plants, all act as antioxidants. The consumption of fruits and vegetables has been linked with several health benefits, a result of medicinal properties and high nutritional value. Antioxidants control and reduce the oxidative damage in foods by delaying or inhibiting oxidation caused by reactive oxygen species (ROS), ultimately increasing the shelf-life and quality of these foods. Beta carotene, ascorbic acid, and many phenolics play dynamic roles in delaying aging, reducing inflammation, and preventing certain cancers. Increasing the consumption of fruits has been recommended by many agencies and health care systems throughout the world. During past several years, phytochemicals have been used worldwide as the traditional herbal medicine. Because of this pharmaceutical industries as well as researchers put a greater emphasis on the phytochemical studies. these phytochemicals present in the different plant parts are used up by the local peoples for healing of certain disorders (Twinkle and Salalkar, 2015).

MATERIALS AND METHODS

Selection and Collection of Fruits

Fresh and well ripened fruits (Tomato, Grapes, Watermelon and Pink Guava) were collected from various organic cultivators in Theni, Madurai and Dindigul Districts. Among the assortment varieties of fruits tomato '**PKM 1'** was released by TNAU, which is suitable for growing in Southern India was selected. Fruits are round with yellow stem end, determinate and ripen uniformly. Guava '**Ruby Supreme'** Variety is one of the easiest tropical fruiting plants to grow for the beginning fruit gardener; 'Ruby Supreme' has baseball-sized fruits that turn yellow when ripe. The inner flesh is highly aromatic, sweet and pink. Grains of grapes

'**Bangalore blue'** are large, oval-shaped and slightly raised longitudinal ribs. The skin is dark violet, medium thick, fragile. The flesh is crunchy and palatable with a mild muscat flavor (with good ripening). The clusters are medium to large, often loose, and branched. '**Arka Manik'** a variety of watermelon fruit is somewhat round (oval) and weighs about 2 kg each. Skin colour is light green with dull green stripes. The flesh is deep red, very sweet and seed arrangement is such that its removal is easier. It is resistant to powdery mildew, downy mildew, tolerant to anthracnose and blossom-end rot.

Processing of Fruits

Fruits like Tomato, Grapes, Red guava and Watermelon, have a short shelf life and are sold for only a short season during summer to make it more available throughout the year and to make it more versatile for use in different products after processing.

Cabinet dryer is the tray dryer method used to dry grains, fruits and vegetables. The nutrient content aftre the drying process using cabinet dryer provides good quality protein, carbohydrate dietery fibre, and other micro-nutrients (Satwase *et al.*, 2013). Skin, pulp and seeds in fruits were separated and placed in trays and the temperature was maintained at 60^0 for 7 hours. After the heat treatment it was ground into a coarse powder and it was stored in a well closed container free from environmental climatic changes for analysis. Before and after processing the fruit samples weight was noted and it was tabulated and interpreted.

Qualitative Phytochemical analysis

Phytochemicals are naturally occurring, biologically active chemical compounds in plants. They act as a natural defense system for host plants and provide colour, aroma and flavor (Ahmed and Urooj, 2010).

The presence of various phytochemicals in fruits was analysed. Phytochemical such as alkaloids, flavonoids, phenol, saponin, tannin, terpenoids, quinons, phlobatannins and steroids were analysed by standard procedures with methanol extracts. Qualitative Phytochemical screening procedure is given in table 1 :

Table - 1

Phytoconstituents	Test	Observation
Alkaloids (Wagner's Test)	2ml Extract + 2 to 3 drops of Ferric Chloride	Greenish to black colour indicates the presence of Alkaloids
Flavonoids (Alkaline Reagent test)	2ml Extract + few drops of NaOH solution	Intense yellow colour which becomes colour less on addition of dilute HCL.
Phenol (Ferric Chloride Test)	2ml Extract + 5% Ferric Chloride	Deep blue or green colour indicates the presence of phenol
Saponins (Frothing test)	2ml Extract + 6ml Distilled water shaken vigorously	Staple froth indicates the presence of Saponins
Tannins (Braymer's Test)	2ml Extract +10% Alcoholic $Fecl_3$	Blue or Green colour indicates the presence of Tannins
Terpenoids (Salkowkis Test)	1 ml of Chloroform + 2 ml of extract + Few drops of Conc. H_2SO_4	Reddish brown precipitate indicates the presence of Terpenoids.
Phlobatanin	2ml Extract + 1ml of 1 % Hcl	Deposition of red precipitate indicate the presence of Phlobatanin
Steroids (Salkowski test)	2ml Extract + in chloroform + Sulphuric acid	Reddish brown ring at the interface indicates the presence of Terpenoids and development of reddish brown colour indicates the presence of Steroids.

Quantitative Phytochemical Analysis

Quantitative phytochemical analysis of fresh and dried fruit samples was done. The procedure followed to quantify the alkaloids, flavanoids and total phenol is given below.

Alkaloids determination by using Harborne (1973) method

5g of the sample was weighed into a 250 ml beaker and 200 ml of 10% acetic acid in ethanol was added and covered and allowed to stand for 4 h. This was filtered and the extract was concentrated on a water bath to one quarter of the original volume. Concentrated ammonium hydroxide was added drop wise to the extract until the precipitation was complete. The whole solution was allowed to settle and the precipitated was collected and washed with dilute ammonium hydroxide and then filtered. The residue is the alkaloid, which was dried and weighed.

Flavanoid determination by the method of Bohm and Kocipai- Abyazan (1994)

A volume of 0.25 ml of the sample was diluted to 1.25 ml with distilled water. 75 µl of 5% sodium nitrite was added and after six minutes 5 ml of 0.1 % aluminium chloride solution was added. 0.5 ml of 0.1M NaOH was added after 5 minutes and made up to 2.5 ml with distilled water. The solution was mixed well and the absorbance was read in ultraviolet spectroscopy at 510 nm along with standard quercetin at 5 - 25 µg concentration.

Total phenol determination by the method of Kumaran (2006)

Determination of total phenolic content Folin–Ciocalteu procedure given by Yu et al. ., (2002) was used to estimate the total phenolic contents in the methanol extract of the plants. Following this method, 0.1 ml of fractions was diluted to 1 ml with distilled water. To this solution 0.5 ml of Folin–Ciocalteu reagent (2N, 1:1) and 1.5 ml of 20% sodium carbonate solution was added. The mixture was incubated for 2 hours at room temperature. The volume of the mixture was raised to 10 ml with distilled water and the absorbance of blue colored mixture was measured at 765 nm in ultraviolet spectroscopy. All determinations were carried out in triplicates.

RESULTS AND DISCUSSION

Table – 2

Qualitative Phytochemical Analysis of Dried Fruit proportions with Methanol Extracts

Fruits	Proportions	Alkaloids	Flavonoids	Phenol	Saponin	Tannin	Terpenoids	Quinons	Phlobatannin	Steroids
Tomato	Skin	+ + +	+ + +	- + +	+ + +	- - -	- - -	- - -	- - -	- - -
	Pulp	+ + +	+ + +	+ + +	+ + +	- - -	+ + +	- - -	+ + +	- - -
	Seed	+ + +	+ + +	+ + +	+ + +	- - -	- - -	- - -	- - -	- - -
Pink Guava	Skin	+ + +	+ + +	+ + +	+ + +	+ + +	- - -	- - -	- - -	- - -
	Pulp	+ + +	+ + +	+ + +	+ + +	+ + +	+ + +	+ + +	+ + +	+ + +
	Seed	+ + +	+ + +	+ + +	- - -	+ + +	- - -	+ + +	- - -	+ + +
Grapes	Skin	+ + +	+ + +	- - -	- - -	- - -	+ + +	- - -	- - -	- - -
	Pulp	+ + +	+ + +	+ + +	- - -	- - -	- - -	+ + +	+ + +	+ + +
	Seed	+ + +	+ + +	+ + +	- - -	+ + +	+ + +	- - -	- - -	- - -
Watermelon	Skin	+ + +	+ + +	+ + +	- - -	- - -	+ + +	+ + +	+ + +	- - -
	Pulp	+ + +	+ + +	- - -	- - -	+ + +	+ + +	+ + +	- - -	+ + +
	Seed	+ + +	+ + +	+ + +	- - -	+ + +	+ + +	- + +	- - -	+ + +

Table - 2 depicts the presence of alkaloids, flavonoids, phenol, saponin, tannin, terpenoids, quinons, phlobtannin and steroid in cabinet dried fruit proportions.

Table 4.7 depicts the presence of phytochemicals in methanolic extracts of dried fruit proportions. Dried tomato skin had alkaloids, flavonoids, phenol and saponin and pulp contains alkaloids, flavonoids, phenol, saponin, terpenoids and phlobtannin. Seed has alkaloids, flavonoids, phenol and saponin. Dried pink guava skin powder contain alkaloids, phenol, saponin and tannin and its pulp contain all the phytochemicals and Its seed holds alkaloids, flavonoids, phenol, tannin, quinons, and steroid. Grape skin contain alkaloids, flavonoids and terpenoids; Pulp had alkaloids, flavonoids, phenol quinons, phlobtannin and steroid; Seed shows the presence of alkaloids, flavonoids, phenol, tannin and terpenoids. Watermelon skin had alkaloids, flavonoids, phenol, terpenoids, quinons and phlobtannin. Pulp had alkaloids, flavonoids, phenol tannin, terpenoids, quinons and steroid. Alkaloids, flavonoids, phenol, tannin, terpenoids, quinons and steroid were present in watermelon seed.

Results of qualitative phytochemical analysis of dried fruits proportions with methanol extracts shows pink guava pulp with all the tested phytochemicals; Alkaloids and flavanoids were present in methanolic extracts of all the dried fruit proportions.

Table – 3

Quantitative Phytochemical Analysis of Cabinet Dried Fruit proportions

Fruits	Proportions	Alkaloids	Total Phenol	Flavanoids
Tomato	Skin	66.17 ± 0.65	24.40 ±0.83	56.74 ±4.17
	Pulp	53.7 ±5.69	72.40 ±0.14	59.39±0.44
	Seed	78.37±0.25	6.62 ± 0.49	13.58±0.45
Pink Guava	Skin	0.08 ± 0.02	6.23 ±2.26	5.76 ± 0.24
	Pulp	50.56 ±0.29	45.73 ± .37	58.83 ± 1.56
	Seed	26.31 ± 1.46	5.60 ± 0.23	0.65 ± 1.03
Grapes	Skin	72.59 ± 0.18	66.37 ±4.11	83.11 ± 0.72
	Pulp	44.70 ± 3.11	67.47 ± 0.18	52.38 ±0.27
	Seed	70.66 ± 3.35	85.15 ± 0.15	82.26 ± 5.39
Watermelon	Skin	57.92 ± 0.75	40.99 ±0.49	4.92 ±0.13
	Pulp	63.13 ±0.58	66.47 ±0.11	52.64 ±0.11
	Seed	58.72 ±0.72	9.56 ±0.33	7.61 ±2.12

Table - 3 shows the quantitative phytochemical analysis of dried fruit proportions. Alkaloids, total phenol and flavanoids were found in skin was 66.17%, 24.40%, and 56.74%, pulp 53.7%, 72.40% and 59.39% and seed 78.37%, 6.62% and 13.58%. Stewart et al. (2000)[1] has reported that the majority of the flavanoids in tomatoes are present in the skin. Pink guava skin was reported that the alkaloids 0.08%, total phenol 6.23% and flavanoids 5.76%. Pulp had the high content of alkaloids 50.56%, Total phenols 45.73 % and flavanoids 58.83% followed by seed alkaloids 26.31%, total phenols 5.60% and flavanoids 0.65%. Grapes seed was noticed high amount of alkaloids 70.66%, total phenol 85.15 % and flavanoids 82.26% followed by its skin (alkaloids 72.59%, total phenol 66.37% flavanoids 83.11%) and pulp (alkaloids 44.70%, total phenol 67.47% and Flavanoid 52.38%). Watermelon skin was high in alkaloids (57.92%) followed by its pulp (63.13%) and seed (58.72%). Total phenol was found in pulp (66.47%) was high when compared with skin (40.99%) and seed (9.56%). Presence of flavanoids in pulp was 52.64%, seed 7.61% and skin 4.92%.

It can be concluded that the presence of alkaloids was high in tomato seed (78.37%) followed by grape skin (72.59%) and grape seed (70.66%). Total phenol was high in grape seed (85.15%) followed by tomato pulp (72.40%) and grape skin (66.37%). Flavanoids are rich in grape skin (83.11%) followed by grape seed (82.26%) and tomato pulp (59.39%). Hence, the quantitative phytochemical analysis of dried fruit proportions concluded that the grapes and tomatoes are having the abundant amount of alkaloids, flavanoids and total phenol.

Conclusion:

Nowadays, a nutritional supplementary transition is replaced of traditional plant based diets that are rich in fruits and vegetables. Fruits consumed fresh as well in dried form plays a significant role in health of people. Since fruits are rich in bio-active compounds which is low in cost when compared to synthetic compounds. This study evidenced that the cabinet dried fruits such as tomato, pink guava, grapes and watermelon Proportions are good sources of natural bioactive compounds and are responsible for the many therapeutic effects. Further research are to be carried out to identify the active molecules and evaluation of their therapeutic significance in the prevention of diseases.

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