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Preliminary Phytochemical Screening of Different Solvent Extracts of Selected Tropical Fruits

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ABSTRACT

The present study evaluates the phytochemical constituents of selected tropical fruits viz, rambutan (*Nepheliumlappaceum*), mango (*Mangiferaindica*), avocado (*Perseaamericana*), and jackfruit (*Artocarpusheterophyllus*). Preliminary phytochemical compositions were carried out for the hexane, butanol, ethanol, chloroform and aqueous extracts. Solvents were taken based on increasing order of their polarity. Qualitative phytochemical analysis of these fruit extracts confirms the presence of various phytochemicals like alkaloids, carbohydrates, phenol, glycosides, terpenoids, flavonoids, saponins, proteins, steroids and tannins.

KEY WORDS: Fruits, Photochemical, Carbohydrates, Extracts

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INTRODUCTION

Fruits constitutes an important part in our diet. The consumption of fruit is not just for a taste and it has become a concern of our health due to the nutrientcontents. Fruits feature considerable amounts of micronutrients such as vitamins,minerals, dietaryfibres and other secondary metabolites as bioactivecompounds[1].This evidence shows theimportanceof several nutrients in fruits for human health. Consumption of fruits rich in several bioactive compounds has led to the reduction of several non-communicable diseases such ascertain types of cancer, inflammation, cardiovascular diseases, cataracts, macular degeneration, and neurodegenerative disease[2]. Recently, consumption of tropical fruit is increasing observedbased on domestic and international market trends due to growing recognition of its nutritional and therapeutic value.

Photochemical constitute one of the most numerous and the widely distributed group of substances found in fruits, vegetables, grains and plants. Colourful fruits and vegetables contain hundreds of phytochemicals that work together with nutrients topromote health and prevent diseases[3]. The most importantbioactive compounds are alkaloids, flavonoids, tannins and phenolic compounds[4]. They can have different mechanisms of actions in thebody, including antioxidants effects, modulation of detoxification enzymes, stimulation ofimmune system, modulation of hormone metabolism, antibacterial and antiviral effect[5,6,7]. During the last two decades, there has been a search for new plant derived drugscontaining the medically useful phytochemicals.The phytochemicalresearch based onethno-pharmacological information is generally considered as aneffective approach in the discovery of new therapeutical and novel agents. Scientists haveidentified thousands of phytochemicals, although only a small fraction has been studiedclosely. However, a key obstacle, which has hindered the acceptance of the alternativemedicines in the world, is the lack of documentation and stringent quality control. There isa need for documentation of research work carried out on traditional medicines[8]. With this backdrop, it becomes extremely important to try towards standardization of the plant material to be used as medicine. The process ofstandardization can be achieved by stepwise pharmacognostic studies[9]. These studies help in identification and authentication of the phytochemicals. Correctidentification and quality assurance of the starting materials are essential pre-requisites toensure reproducible quality of natural medicine which will contribute to its safety andefficacy.Naturalphytochemicals at the low levels present in fruits and vegetables offerhealth benefits, but antioxidant dietary supplement compounds may not be effective orsafe when consumed at higher doses even in a pure dietary supplement form. Generally,taking higher doses increases the risk of toxicity[10]. Despite the numerous medicinal uses attributed to these fruits, there hadbeen no documented evidence to our knowledge. Hence, the

objective of the present studyis to evaluate the phytochemical constituent present in selected tropical fruits.

MATERIALS AND METHODOLOGY

Collection of fruit material

Selected fruits for the study was purchased from a local market in the month of May 2014. The fruits were thoroughly washed, shade dried, homogenized to fine powder and stored in air tight bottles.

Chemicals, Reagents and Solvents

All chemicals, reagents and solvents used during the experimentation were of analytical grade.

Preparation of Fruit Extracts

10 g of powdered samples were weighed and mixed with 100 ml of five different solvents (methanol, ethanol, acetone, chloroform and distilled water) in conical flasks and kept in rotatory shaker at 150 rpm for 24 hours. After 24 hours it was filtered with Whatman No.1 filter paper. The filtrates were evaporated in a hot air oven at 40^0 C until dry. The extracts were stored in sample bottles at 40^0 C prior to use.

Preliminary phytochemical screening:

The different solvent extracts of fruits rambutan (*Nepheliumlappaceum*), mango (*Mangiferaindica*), avocado (*Perseaamericana*), and jackfruit (*Artocarpusheterophyllus*) were used to screen the phytochemicals like reducing sugar, tannins, alkaloids, saponins, amino acids, flavonoids, phenolic compounds, sugar, sterols, terpenoids and glycosides by standard method [11].

Reducing sugar:

Fruit extracts were treated with 2 mL of Fehling's reagent; 3 mL of water was added and allowed to boil. The development of red orange colour indicated the presence of reducing sugar.

Tannins:

The test extracts were divided into two equal portions. Sodium chloride solution was added to one portion of the extract and 1% Gelatin solution to a second portion. The development of white precipitate indicated the presence of tannins. Positive tests were confirmed by the addition of ferric chloride solution to the extract and resulted in a characteristic blue, black or green colour.

Alkaloids:

The test extracts were taken with 2N hydrochloric acid. The aqueous layer was formed. It was decanted and to which were added one or two drops of Mayer's reagent. The test content changed into white turbidity or precipitated in positive reaction.

Saponins:

The test extracts were mixed with water and shacked well. The test solution changed into foamy leather indicated the presence of saponins.

Amino acids:

The test extracts were mixed with small quantity of ninhydrin. Formation of blue colour confirmed the presence of amino acid.

Flavonoids:

The test extract in alcohol mixed with a bit of magnesium and one or two drops of concentrated hydrochloric acid and heated. The test solution changed into red or orange red colour in the presence of flavonoids.

Phenolic compounds:

The test extract in alcohol was taken with a bit of magnesium and one drop of neutral ferric chloride. Change of intense colour in the test content, showed positive result for phenolic compounds.

Sugar:

The test extracts were mixed with minimum quantity of anthrone and few drops of concentrated sulphuric acid and heated. Change of colour from green to purple showed the presence of sugar.

Sterol:

The test extracts were mixed with minimum quantity (< 1 mL) of chloroform, 3 to 4 drops of acetic anhydride and one drop of concentrated sulphuric acid. The test content in purple colour changed into blue-green indicated the presence of sterol. The result was qualitatively determined and recorded.

Terpenoids:

The test extracts were mixed with chloroform, and concentrated H_2SO_4 was carefully added to form a layer. A reddish-brown colouration of the interface formed to show positive results for the presence of terpenoids.

Glycosides:

The test extracts were mixed with glacial acidic acid, few drops of 5% $FeCl_3$ and

concentrated H_2SO_4 were added reddish brown colour at the junction of the two liquid layers formed, and upper layer appeared bluish green which indicated the presence of glycosides.

RESULTS AND DISCUSSION

In the present study phytochemical screening of fourtropical fruits like rambutan, mango, avocado and jackfruit were done. The phytochemical analysis conducted is presented in Tables1 to 4. The results revealed that some of the phytochemicals analysed were present in the extracts of all the fruits. Of the eleven phytochemicals screened, sugars and amino acids were present commonly in all the studied fruits. From rambutan extracts, (Table-1) saponins, phenolic compounds and sugars were present in all the studied extracts.Aqueous extract had all the ten phytoconstituents except amino acids. From mango extracts,(Table-2) phenols and sugars were present in all the solvents. Amino acids were found in all the solvents except in the chloroform extract.Hexane extract showed the presence of all phytoconstituents except saponins and glycosides. From avocado extracts, (Table-3) amino acids and flavonoids were present in all the extracts. Ethanolic extract showed the absence of alkaloids and sugars, whereas the aqueous extract showed the absence of tannins and saponins. From jackfruit extracts, (Table-4) sugars were present in all the solvents whereas saponins were absent only in ethanolic extracts.

Table 1: Preliminary phytoconstituents of Rambutan extracts

Phytoconstituents	Solvents				
	Hexane	Butanol	Ethanol	Chloroform	Aqueous
Reducing Sugar	+	+	-	+	+
Tannins	-	-	+	-	+
Alkaloids	+	+	-	+	+
Saponins	+	+	+	+	+
Amino Acids	+	-	+	+	+
Flavonoids	-	+	-	-	+
Phenols	+	+	+	+	+
Sugars	+	+	+	+	+
Terpenes	+	+	-	+	+
Cardiac Glycosides	+	+	-	+	+
Steroids	+	-	+	+	+

Table2: Preliminary phytoconstituents of Mango extracts

Phytoconstituents	Solvents				
	Hexane	Butanol	Ethanol	Chloroform	Aqueous
Reducing Sugar	+	+	+	-	-
Tannins	+	-	-	+	+
Alkaloids	+	-	+	-	-
Saponins	-	-	+	+	+
Amino Acids	+	+	+	-	+
Flavonoids	+	+	+	-	+
Phenols	+	+	+	+	+
Sugars	+	+	+	+	+
Terpenes	+	-	-	-	-
Cardiac Glycosides	-	-	+	-	+
Steroids	+	-	+	-	+

Table3: Preliminary phytoconstituents of Avocado extracts

Phytoconstituents	Solvents				
	Hexane	Butanol	Ethanol	Chloroform	Aqueous
Reducing Sugar	+	+	-	-	-
Tannins	+	+	+	-	-
Alkaloids	-	+	-	-	+
Saponins	+	-	+	+	-
Amino Acids	+	+	+	+	+
Flavonoids	-	+	+	+	+
Phenols	+	-	+	+	+
Sugars	+	+	-	+	+
Terpenes	+	-	+	+	+
Cardiac Glycosides	-	-	-	-	+
Steroids	+	-	+	+	+

Table4: Preliminary phytoconstituents of Jackfruit extracts

Phytoconstituents	Solvents				
	Hexane	Butanol	Ethanol	Chloroform	Aqueous
Reducing Sugar	+	-	+	-	-
Tannins	+	-	+	-	-
Alkaloids	-	-	+	-	+
Saponins	+	+	+	-	+
Amino Acids	-	+	-	+	+
Flavonoids	-	+	+	+	+
Phenols	-	-	+	-	-
Sugars	+	+	+	+	+
Terpenes	-	+	+	-	-
Cardiac Glycosides	-	-	+	+	+
Steroids	-	+	+	-	-

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