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PHYTOCHEMICAL ANALYSIS OF PEEL OF *AMORPHOPHALLUS PAEONIIFOLIUS*

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ABSTRACT

The present study aims qualitative screening of the phytochemicals present in the peel of *Amorphophallus paeoniifolius* (Jimikand/ Suran) for its utilization as a potential therapeutic. The peel extract was prepared by dissolving dried peel powder in solvents like water, methanol, petroleum ether, and chloroform and concentrated using a rotary vacuum evaporator. The standard qualitative test for each of the peel solvent extracts was performed, which indicated the presence of alkaloids, tannins, phenols, carbohydrates and fat in the peel. Total phenolic content was found better in methanolic and chloroform extracts than other aqueous and petroleum ether extract. The present study summarizes *Amorphophallus* peels utilization and verification of bioactive ingredients that include important constituents for pharmacological activity.

KEYWORDS: **Phytochemical Screening, *Amorphophallus paeoniifolius* , Phenol, Peel**

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INTRODUCTION

Amorphophallus paeoniifolius commonly known as Elephant foot yam is a highly potential tropical tuber crop of Araceae family. Elephant foot yam is widely grown and consumed in south eastern countries like India, Philippines, Malaysia, Indonesia and other south eastern countries. In India the tubers of *Amorphophallus paeoniifolius* is majorly cultivated in Andhra Pradesh, West Bengal, Gujarat, Kerala, Tamil Nadu, Maharashtra, Uttar Pradesh, and Jharkhand and commonly known as "Suran" or "Jimmikand".[1]Tubers of *Amorphophallus sp.* have been widely used as a potential natural medicinal product in traditional Indian Ayurveda. [2] From the traditional era, edible plants have been used for treatment of many chronic and fatal diseases. According to the World Health Organization, more than 80% of the world's population relies on traditional medicine for their primary healthcare needs. Plants have many substances that can be used to treat chronic as well as infectious diseases.[3]In recent times, natural resources has grown to interest due to the increasing and alarming levels of side effects exhibited by the chemically synthesized drugs. [4]The studies on corm extracts of the tuber of *Amorphophallus paeoniifolius* have concluded that the tubers have gastroprotective, analgesic, antibacterial, antioxidant, anti-tumor, anti-inflammatory, antibacterial, antifungal and cytotoxic activities [5-15] They are traditionally used in treatment of elephantiasis, tumors, inflammations, hemorrhoids, hemorrhages, vomiting, cough, bronchitis, appetizer, asthma, anorexia, dyspepsia, flatulence, colic, constipation . [16, 17]

Qualitative assay of different solvent extracts of corm was carried out for the presence of phytoconstituents. Petroleum ether, Chloroform, Methanol and aqueous extracts of *Amorphophallus paeoniifolius* corm are tested for the presence of different phytoconstituents. The petroleum ether extract of corm contains alkaloids, steroids, fats & fixed oil. The chloroform extract of corm contain alkaloids. The methanol extract of corm contains alkaloids, steroids, flavonoids and carbohydrates. The aqueous extract of corm contains flavonoids, tannins, proteins and carbohydrates. Ethyl acetate and Hexane of corm extracts contains Alkaloid, flavones, carbohydrate and saponins.[18, 19] However, phytochemical analysis of peel of *Amorphophallus paeoniifolius* is yet to be investigated. This paper deals with the analysis , characterization of phytochemicals and total phenol quantification from different extracts of peel of *Amorphophallus paeoniifolius*.The current study aims to investigate the phytochemicals present within the peel of *A. paeoniifolius* and analyzing the best solvent for extraction of the peel phytochemicals. Peel of the tuber is a waste product and if the therapeutic potential of the peel extract is established it would serve as a potent natural drug and also promote waste management.

MATERIALS AND METHODS

MATERIAL

The tubers of *Amorphophallus paeoniifolius* were collected from local market of dist. Ghaziabad, Uttar Pradesh. Fine segments of the peel was scraped from the tuber, washed and oven dried for 24 hrs at 50 °C. Dried peel sample was ground coarsely and stored.

CHEMICALS

PEEL EXTRACTS PREPARATION

The peel extracts was prepared in four different solvents, i.e. water, methanol, chloroform and petroleum ether. Dried powder was weighed and soaked (1:3) in the respective solvents and was kept in shaking incubator at 30 °C and 180 rpm for 3 days. Extracts were filtered using Whatmann No.1 filter paper. The extracts were concentrated to dryness. The rotary vacuum evaporator was used for further drying the extracts in vacuum at 40°C. The dried extracts obtained were stored in – 20 °C for further use.

PERCENTAGE YIELD

Different extract yields were calculated according to mentioned formula

Percentage yield = (Weight of Extract / Weight of ground plant material) * 100

PHYTOCHEMICAL SCREENING (QUALITATIVE ANALYSIS)

Test for Alkaloids

Mayer's test

Mayer's reagent (2-3 drops) was added to 1 ml of various extracts. Cream color precipitate is observed in alkaloids.

Dragendorff's test

In a test tube containing 1 ml of extract, few drops of Dragendorff's reagent (Potassium bismuth Iodide solution) was added. Alkaloids show reddish brown precipitate with the same.

Wagner's test

Wagner's reagent was added to the various test solutions containing 1 ml of extracts. Alkaloids show a reddish brown precipitate with Wagner's reagent.

Hager's test

Presence of alkaloid is confirmed due to formation of yellow color precipitate with Hager's reagent.

Test for Glycosides

Legal's test

All the extracts (1ml) were treated with Pyridine and then alkaline Sodium nitroprusside solution was added. Blood red color shows the presence of glycosides.

Test for Tannins/Phenols

Gelatin test

1% Gelatin solution with 10% Sodium chloride was added to the test solution containing 2 ml of extract. White precipitate gives the presence of tannins.

Ferric chloride test

Presence of blue green color with Ferric chloride shows positive test for tannins.

Alkaline reagent test

All the test solutions containing 1 ml of extract was treated with Sodium hydroxide solution. Yellow to red precipitate within shorter time shows the presence of tannins.

Folin-Ciocalteu reagent test

1ml of Folin-Ciocalteu reagent and 0.5 ml of Na2CO3 were added to 1 ml extract. Appearance of blue colour confirmed the presence of phenol.

Test for Flavonoids

Alkaline reagent test

Few drops of Sodium hydroxide was added to 0.5 ml of extract. Formation of yellow color and then to colorless on the addition of dilute Sulphuric acid indicates presence of flavonoids.

Test for Proteins and Amino Acids

Millon's test

To the test solution 2ml of Millon's reagent (Mercuric nitrate in Nitric acid containing traces of nitrous acid was added. Formation of white color precipitate and then red upon heating indicates the presence of proteins and amino acids.

Test for carbohydrates

Molisch's test

1ml of α-Naphthol solution, and concentrated Sulphuric acid through the sides of test tube were added to 1 ml of extarct. Occurrence of a violet color ring indicates the presence of carbohydrates.

Benedict's test

Test solution containing 0.5 ml of extract was treated with a few drops of Benedict's reagent (alkaline solution containing cupric citrate complex) then heated in boiling water bath; reddish brown precipitate confirms the presence of carbohydrate.

Camnelisation test

Test solution (1 ml) when treated with strong Sulphuric acid gives a burning sugar smell. This indicates the presence of carbohydrates.

Fehling's test

1 ml extracts of each solvent were treated with 1 ml of each of Fehling's solution A (Copper sulfate in distilled water) and B (Potassium tartarate and Sodium hydroxide in distilled water) and boiled. A brick red precipitation of cuprous oxide indicates the presence of reducing sugar.

Test for fats and fixed oils

Saponification test

The tube containing test solution of various extracts (500µl) ml) was shaken vigorously. Formation of froth indicates the presence of saponins.

Determination of total phenol content

The total phenolic content of dried peel extract was determined by using the Folin-Ciocalteu assay. [20]. 2.5 ml of 10% Folin-Ciocalteu reagent and 2 ml of Na_2CO_3 (7.5% w/v) were added to 0.5 ml of extract. The resulting mixture was incubated at 30°C for 30 min with intermittent shaking. Absorbance was measured at 765 nm. Gallic acid was used as standard. All the experiments were carried out in triplicates.

RESULTS AND DISCUSSION

Four different solvents were used to prepare extract from peels of *A. paeoniifolius.* Highest yield was of methanolic extract 28.8% followed by chloroform extract 25% and aqueous extract 18.74% and lowest was of petroleum ether extract 11.86%. Qualitative phytochemical analysis of various solvent extracts of peel of *Amorphophallus paeoniifolius* was done. (Table 1) The petroleum ether gave positive tests for tannins, sterol and terpenoids, carbohydrates and fat and fixed oil. The chloroform extract contains alkaloids, tannins, phenol, proteins, sterols, terpenoids, carbohydrates and fat. Methanolic extract contains tannins, phenol, flavonoids, sterols and terpenoids, carbohydrates and fat. Aqueous extract contains alkaloids, phenol, tannins, flavonoids, proteins and amino acids, carbohydrates and fat. Based on the phytochemical constitution of the various extracts it was observed that the peel contains a substantial amount of tannins and phenols, alkaloids and carbohydrates. Glycosides were absent in all the extracts. Plant phenolics are a major group of phytochemicals act as primary antioxidants. *Amorphophallus* corm contains some kind of phytochemicals like polyphenols and flavonoid with antioxidative effect. Phenolic compounds have potential protective role, against oxidative damage diseases like coronary heart disease, stroke, and cancers. Therefore, determination of total phenolic content was estimated from the extracts of *Amophophallus paeoniifolius* peel. Total phenol content of aqueous, methanolic, chloroform and petroleum ether extract was observed to be 1.16, 4.41, 3.87 and 0.37 (mg/g) gallic acid per g extract powder, respectively, with reference to the gallic acid standard curve (Y= .0124x – 0.0014, R2 = 0.9868) (Figure1). Methanolic and choloroform extract showed better result in terms of yield and total phenol content.

TABLE 1

Phytochemical screening tests for various extracts

Phytochemicals		Petroleum ether extract	Chloroform extract	Methanol extract	Aqueous extract
Alkaloids	Mayer's Test	-	++	-	-
	Dragendorff's Test	-	+	-	+
	Wagner's Test	-	+	-	+
	Hager's Test	-	++	-	-
Glycosides	Legal's Test	-	-	-	-
Tannins	Gelatin Test	+	+++	-	+
	Ferric Chloride Test	+	++	-	+
	Alkaline Reagent Test	-	+	++	+
Phenols	Folin-Ciocalteu reagent	+	+++	+++	++
Flavonoids	Zinc Hydrochloride Reduction Test	-	-	++	+
	Alkaline Reagent Test	-	-	++	++
Proteins and Amino Acids	Millon's Test	-	+	-	++
Sterol and terpenoid	Salkowski test	+	+	++	-
Carbohydrates	Molisch's test	+	+	++	-
	Benedict's test	-	-	++	+
	Camnelisation test	-	+	+	-
	Fehling's test	+	++	++	+
Fats & Fixed Oils	Saponification test	+	+++	+	+

'+++' = present in high quantity, '++' = present in moderate quantity

+ indicates presence of the phytochemical and – indicates absence of the phytochemical.

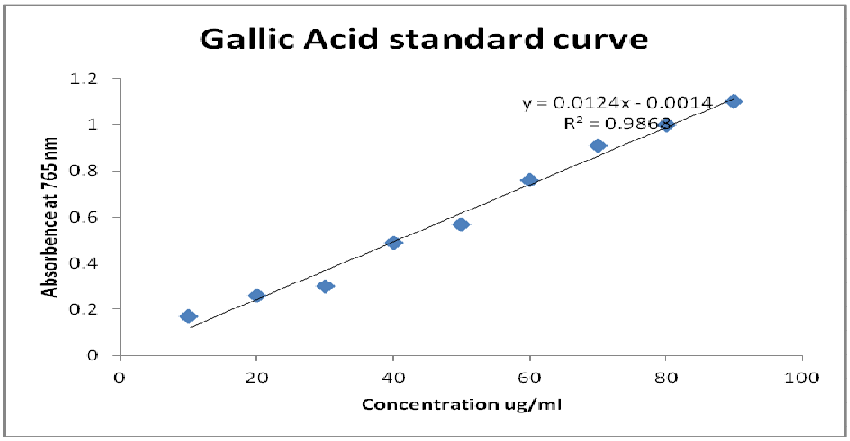

FIGURE 1
GALLIC ACID STANDARD CURVE

CONCLUSION

Phenols are considered as bioactive non-nutritional compounds, due to their antioxidant properties, against free radicals effects. The maximum phenolic content was found in methanolic extract. The importance of antioxidant activities of phenolic compounds has reached a new high in recent years. The bioactive compounds reported in various extracts and subsequent literature evidences of their medicinal activities provide ample proof to the therapeutic and pharmacological potential of *Amorphophallus paeoniifolius* which needs to be further explored and some pharmacological activities has to be performed and validated so as to use it as a potential force in the field of health care against many diseases. Based on these facts, the authors hope that these screening of phyto-chemicals from peel of *Amorphophallus paeoniifolius* highlight the multifarious role of this neglected aroid that has great potential in novel drug discovery.

CONFLICT OF INTEREST STATEMENT
We declare that we have no conflict of interest.

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