

Original Research Article

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Phytochemical Analysis of Plant Resources having Antimicrobial Properties Obtained from Aravali Hills of Rajasthan, India

Sudha Babel*, Rupali Gupta and Latika Sachihar

Department of Textiles & Apparel Designing, College of Home Science, MPUAT,
Udaipur, India

*Corresponding author

ABSTRACT

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Medicinal plants have age long remedies for human diseases because they contain components of curative value. An increasing interest in herbal remedies is observed in several parts of India and many of the herbal remedies are incorporated into traditional medicinal plant practice. In the present study questions related diseases that have been managed traditionally using medicinal plant were asked by sixty respondents. Collected data were analysed. The study reports the plant sources used by rural women to cure the various diseases and phytochemical analysis plant sources used by the women. On the basis of the study it can be concluded that these plant resources may serve as a potential source for wet finish application on the textiles for treatment of skin wounds, antifungal, anti-microbial finish, hence further research should be conducted in order to explore their applications.

Introduction

According to World Health Organization (WHO) more than 80% of the world's population relies on traditional medicine for their primary healthcare needs. Use of herbal medicines in Asia represents a long history of human interactions with the environment. Plants used in traditional medicine contain a wide range of ingredients that can be used to treat chronic as well as infectious diseases. A vast knowledge of how to use the plants against different illnesses may be expected to have accumulated in areas where the use of plants is still of great importance (Diallo *et al.*, 1999). The medicinal value of plants lies in some chemical substances that produce a

definite physiological action on the human body. The most important of these bioactive compounds of plants are alkaloids, flavonoids, tannins and phenolic compounds (Edeoga *et al.*, 2005). Developing countries like India depend on plant resources mainly for herbal medicines, food, forage, construction of dwellings, making household implements, sleeping mats, and for fire and shade.

The use of medicinal plants as traditional medicines is well known in rural areas of many developing countries (Sandhu and Heinrich, 2005; Gupta *et al.*, 2005). Traditional healers claim that their medicine is cheaper, more effective and impart least side effects as compared to synthetic medicines. In

developing countries, low-income people such as farmers, people of small isolate villages and native communities use folk medicine for the treatment of common infections (Rojas *et al.*, 2006). For millennia, the Indian population has depended upon mostly plant based crude drugs for the treatment of variety of human ailments. India has about 18,000 species of angiosperms, of which about 2,500 species are considered as important source of medicinal and aromatic chemical components in modern medicine also, plants occupy a very significant place as raw material for some important drugs.

Undulating hills of Aravali, supporting the dry deciduous forests, provide an unimaginable beautiful ambience. The area is characteristically rich in floral diversity-particularly medicinal plants. It has numerous floral and faunal species of global conservation significance. The rare flora comprises *Kadaya* (giving medicinal gum), *Gugal*, *amla* and *Moosli* etc. The predominant trees are- *Khair*, *Salai*, *Modad*, *Dhavada*, *Khakhara*, *Timru*. During late winters (February-March) *Khakhara*-the flame of the forests- known by many different names such as- *Palash*, *Tesu*, *Kesudo*, *Dhak* etc. is generally in bloom with its striking red colour resembling flames in the forests rajasthan-trekking.com/the-aravali.htm

In general, these plants are used in folk medicine in the treatment of skin diseases, venereal diseases, respiratory problems and nervous disorders. There is lack of scientific studies on these selected plants. Screening of medicinal plants for antimicrobial activities are important for finding potential new antimicrobial finishes for textiles. This paper based on results of survey conducted in Udaipur where the questions about plant sources used for curing the diseases were asked, on the basis of results this paper reports documentation of Plant Resources having

Antimicrobial Properties and the phytochemical analysis for different plant extracts.

Phyto-chemical screening of plant sources

The identified plant sources of the region were subjected to phyto-chemical analysis for screening of plant sources for their antimicrobial properties.

Materials and methods for phyto-chemical screening of plant sources

Selection of the plant sources

The leaves of ten plant sources were collected in around operational villages which were washed with distilled water, shade dried and powdered.

Solvents used in extraction procedures

Ethanol, Methanol, Chloroform, Acetone and distilled water.

Preparation of plant extract by aqueous decoctions

20 gms of dry leaf powder of selected plant sources was boiled in 100ml distilled water for 15 minutes, it was allowed to cool and then filtered. The filtrate was used as the aqueous decoctions.

The leaf extracts of eleven plant sources were analyzed for the presence of flavonoids, alkaloids, phenols, saponins, terpenoid and tannins according to standard methods.

Alkaloids [Mayer's test]

1.36gm of mercuric chloride dissolved in 60ml and 5gm of potassium iodide were dissolved in 10 ml of distilled water respectively. These two solvents were mixed

and diluted to 100ml using distilled water. To one ml of acidic aqueous solution of samples few drops of reagent was added. Formation of white or pale precipitate showed the presence of alkaloids.

Flavonoids

In a test tube containing 0.5ml of extract of the samples, 5 to 10 drops of diluted HCl and small amount of Zn and Mg were added and the solution was boiled for few minutes. Appearance of reddish pink or dirty brown colour indicated the presence of flavonoids.

Saponins

A drop of sodium bi-carbonate was added in a test tube containing about 50ml of an aqueous extract of sample. The mixture was shaken vigorously and kept for 3min. A honey comb like froth was formed and it showed the presence of saponins.

Phenols [Ferric chloride test]

To 1ml of alcoholic solution of sample, 2ml of distilled water followed by a few drops of 10% aqueous ferric chloride solution were added. Formation of blue or green colour indicated the presence of phenols.

Tanins [Lead acetate test]

In a test tube containing about 5ml of an aqueous extract, a few drops of 1 % solution of lead acetate was added. Formation of a yellow or red precipitate indicated the presence of tannins.

FeCl₃ test

A 2ml filtrate [200mg of plant material in 10ml distilled water, filtered], and 2ml of FeCl₃ were mixed. A blue or black precipitate indicated the presence of tannins

Terpenoid

2ml of chloroform and 1ml of concentrated H₂SO₄ was added to 1 mg of extract and observed for reddish brown colour that indicated the presence of terpenoid.

Results and Discussion

Phyto-chemical screening of plant sources

The identified plant sources of the region were subjected to phyto-chemical analysis for screening of plant sources for their antimicrobial properties.

The results of the phytochemical screening in Table 1 indicated the presence of Alkaloids, glycosides, saponin, phenols, steroids etc. The presence of these secondary metabolites has contributed to its medicinal value as well as physiological activity. For instance Flavonoids have been referred to as nature's biological response modifiers, because of their inherent ability to modify the body's reaction to allergies and virus and they showed their anti-allergic, anti-inflammatory, anti-microbial and anti-cancer activities. The positive effects of glycoside and cardiac glycoside are not common but their toxic effects include decreased heart rate, sympathetic activity and systematic vascular resistance. The presence of some of these anti nutrients can be reduced by various processing technique. Plant steroids possess insecticidal and antimicrobial properties. They are also used in nutrition, herbal medicine and cosmetics.

Tannins were reported to exhibit antiviral, antibacterial and anti-tumour activities. It was also reported that certain tannins were also used as diuretic. Tannins can be used as an anti-bacterial because it has phenon group, so tannin have properties like alcohol, an antiseptic that can be used as antimicrobial component.

Table.1 Phyto-chemical screening of plant sources

S.no.	Plant sources	Medium of extraction	Alkaloids	Flavonoids	Saponins	Phenol	Tannins	Terpenoids
1	Ratanjot Leaves	Methanol	+	+	-	+	+	+
		Ethanol	+	+	-	+	+	-
		Chloroform	-	-	-	-	-	-
		Acetone	+	+	+	+	+	+
		Water	+	+	+	+	+	+
2	Neem leaves	Methanol	-	+	+	+	+	+
		Ethanol	+	+	+	+	+	+
		Chloroform	-	-	-	+	+	-
		Acetone	+	+	+	+	+	+
		Water	+	+	+	+	+	+
3	Karanch leaves	Methanol	+	+	-	+	+	+
		Ethanol	-	+	-	+	+	+
		Chloroform	-	-	-	-	-	-
		Acetone	-	+	+	+	+	+
		Water	+	+	+	+	+	+
4	Peepal Leaves	Methanol	+	+	-	-	+	-
		Ethanol	+	-	+	-	+	+
		Chloroform	-	-	-	-	+	+
		Acetone	+	+	-	-	+	+
		Water	+	+	-	-	+	-
5	Chemeli Leaves	Methanol	+	+	-	-	-	+
		Ethanol	+	+	-	-	-	-
		Chloroform	-	-	-	-	-	+
		Acetone	+	-	-	+	+	-
		Water	+	+	-	-	-	-
6	Mahuaa Leaves	Methanol	-	-	-	+	+	+
		Ethanol	-	+	+	+	+	+
		Chloroform	+	-	+	+	+	+
		Acetone	+	+	-	-	-	+
		Water	+	+	-	-	+	+
7	Heena Leaves	Methanol	+	+	+	+	+	+
		Ethanol	+	+	+	-	-	+
		Chloroform	+	-	-	+	+	-
		Acetone	+	+	-	+	+	+
		Water	+	+	+	+	+	+
8	Amaltas Leaves	Methanol	-	-	+	-	-	-
		Ethanol	-	-	+	-	-	+
		Chloroform	-	-	-	-	-	+
		Acetone	-	-	+	+	-	+
		Water	-	-	+	+	+	+
9	Guava Leaves	Methanol	+	-	-	+	-	+
		Ethanol	+	-	-	+	+	+
		Chloroform	-	-	-	-	-	-
		Acetone	+	-	-	+	+	-
		Water	+	-	-	+	+	+
10	Jammun Leaves	Methanol	-	+	+	+	+	+
		Ethanol	+	+	+	+	+	+
		Chloroform	-	-	-	+	+	-
		Acetone	+	+	+	+	+	+
		Water	-	+	+	+	+	+
11	Arandi leaves	Methanol	-	-	+	-	-	-
		Ethanol	-	-	+	-	-	+
		Chloroform	-	-	-	-	-	+
		Acetone	-	-	+	+	-	+
		Water	-	-	-	-	-	-

Saponin is used as mild detergents. It is also used to allow antibody access in intracellular proteins. In medicine, it is used in hypercholesterolemia, hyperglycaemia, anti-oxidant, anticancer, antifungal, anti-inflammatory, weight loss, etc.

From the present study, it can be assumed that these leaves may serve as a potential application for treatment of skin wounds, antioxidant, antifungal, anti-allergic, anti-inflammatory, anti-microbial etc, The results obtained from phyto chemical revealed that the plants contained bioactive agents which are connected with antimicrobial properties in plants. These agents are alkaloids, saponins, flavonoids and tannins. Further research is needed to find out the uses of these extracts for the application of antimicrobial finishes on the textiles.

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