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PRELIMINARY PHYTOCHEMICAL SCREENING OF PLANT EXTRACTS PREPARED FROM TRADITIONAL MEDICINAL PLANTS OF RAJASTHAN

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ABSTRACT

Phytochemical compounds are important chemical source of nutrition naturally occurring in most of the plants specifically medicinal plants. These chemical compounds including alkaloids, flavonoids, carotenoids, terpenoids, phenols, and many more contain antimicrobial properties against variety of microorganisms including bacteria and fungi. The present research study is based on the phytochemical analysis of four selected medicinal plants of Rajasthan state including *Catharanthus roseus*, *Calotropis procera*, *Ocimum sanctum*, and *Nerium indicum*. Leaves, stem, and flowers of selected medicinal plants were washed, dried, and powdered for extraction process. The plant extracts were prepared in different solvents including aqueous, ethanol, and methanol. Phytochemical analysis of all the plant parts prepared in selected three solvents was conducted. The objective of this research was to screen the various phytochemicals present in the medicinal plants known for antimicrobial properties. The medicinal plants showed the presence of several important chemical compounds including alkaloids, flavonoids, terpenoids, and phenols in most of the plant extracts. Phytochemicals are known for curing various plant diseases and hence could play an important role in agriculture and crop protection.

KEYWORDS

Phytochemical, Medicinal plants and Plant extracts.

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INTRODUCTON

Medicinal plants represent vast source of natural drugs known to cure several diseases including plant, animals, and human beings¹. These plants contain phytochemicals falling into two categories including primary and secondary metabolites. Primary metabolites directly contribute in growth and development of plants. All the physiological function of plants and organisms are performed by the primary metabolites. On the other hand,

secondary metabolites do not directly contribute in plant growth, development, and reproduction, but, play essential role in survival of plants². Vitamins, amino acids, carbohydrates, proteins, lipids, nucleosides, and several organic compounds can be categorized into primary metabolites, whereas, secondary metabolites include alkaloids, steroids, phenols, and terpenoids. Patharajan and Abirami (2014), studied the antioxidant and phytochemical analysis of *Catharanthus roseus* leaves. The plant extracts were prepared in several solvents including ethanol, methanol, acetone, hexane, butanol, and water. The results showed the presence of several metabolites including alkaloids, terpenoids, steroids, flavonoids, carbohydrates, and many more in different solvents tested³. Similarly, Yadav *et al*, (2014), studied the preliminary phytochemical study of six selected medicinal plants that were seen important in drug and pharmaceutical field. Several phytochemicals including tannins, flavonoids, terpenoids, saponins, steroids, phlobatannins, carbohydrates, glycosides, coumarins, alkaloids, proteins, emodins, anthraquinones, anthocyanins, and leucoanthocyanins were studied by standard methods from the selected six plants. The results were positive to neutral for all the tests. Flavonoids and tannins were found present in all the plant extracts tested⁴.

The objective of this research emphasizes on studying the phytochemical constituents of medicinal plants correlates with the biological activity of plants involved in various antifungal and antimicrobial activities. These phytochemical studies contribute in knowing the medicinal importance of plants and utilizing them in curing various diseases involved in crop protection and agriculture development.

MATERIAL AND METHODS

Plant materials

The four selected medicinal plants including *Catharanthus roseus*, *Calotropis procera*, *Nerium indicum*, and *Ocimum sanctum* were collected from different locations of Ajmer city, located in the center of Rajasthan state.

Extraction of plant materials

Fresh plant parts of selected medicinal plants were washed with alcohol followed by autoclaved distilled water twice. The plant parts were dried, powdered, and crushed in the individual solvents. The plant materials were subjected to centrifugation for 10–15 min (at 10000 rpm). The supernatant was collected after filtration and made to known volume by adding sterile ethanol, methanol, and aqueous stored for further antimicrobial screening purpose.

RESULTS AND DISCUSSION

The phytochemical screening of the selected four medicinal plants was conducted using the standard methods mentioned in Table No.1. The results shown in Table No.2, 3, and 4 were obtained by screening of three different solvents including aqueous, ethanol, and methanol. The test results reveal the presence of several secondary metabolites playing important role in plants growth and other basic metabolic activities.

In this research, we studied the phytochemical constituents present in the selected four medicinal plants. These medicinal plants are known to possess antimicrobial properties and hence play important role in crop protection and drug development. The secondary metabolites are required for maintaining the biological activities of the plants including anti-microbial, anti-inflammatory, antioxidant, hypoglycemic, and many more³.

All the plant extracts of medicinal plants were found with positive results for alkaloids and flavonoids. Flavonoids are known to possess strong antioxidant properties with free radical activities. These properties can prevent the damage and harm to cell oxidative nature and hence have strong potential for preventing cancerous activities. Besides, they are also known to promote growth and cell development of plants^{4,5,6}. Alkaloids are important group of secondary metabolites known as storage source of nitrogen, potassium, and calcium. Additionally, they play several important roles including growth promoters, protective agents against several predators, and essential mineral providers⁷. Moreover, terpenoids, found positive in most of the results conducted, are well knowns as a

strong antimicrobial, antifungal, immunomodulatory, anti-inflammatory, anti-allergic, and anti-parasitic agents^{4,8,9}. Carbohydrates and reduced sugars increase the immune system and hence are known to provide the basic strength and support to the plant under both favorable and unfavorable conditions⁴. Both the phytochemicals were found in most of the tested plant extracts and hence exert a beneficial action on the biological functions of the medicinal plants. For phenol results, absence in aqueous and ethanol flower extracts of *O. sanctum* and *N. indicum* respectively were observed. However, methanol showed absence of phenols in a few plant extracts. Phenols are well known for development of plants. Additionally, they also contribute in biosynthesis of several pigments and lignin. Phenols play an important role in plants defense mechanism and support system¹⁰.

Table No.1: Preliminary phytochemical test conducted for the selected medicinal plant extracts

S.No	Phyto-compounds	Test	Observation and results
1	Alkaloids	2ml extract+2 drops hexane+ 2ml HCl+2ml C6H3N3O7	Yellow precipitate
2	Phenols	2ml extract+2-4 drops FeCl3	Blue-black precipitate
3	Flavonoids	1ml extract+2ml H2O+1ml NH3+2 drops conc. H2SO4	Yellow precipitate
4	Terpenoids	2ml extract + 2ml CH3OH + 2 drops conc. H2SO4	Reddish brown precipitate
5	Reduced sugars (Benedict's test)	2ml extract+ 2mlBenedict's solution + heat on water bath	Greenish yellow precipitate
6	Carbohydrates (Molisch's test)	2ml extract + 2 dropsethanolic α -naphthol+2ml conc. H2SO4	Reddish violet ring towards the junction

Table No.2: Phytochemical constituents of four medicinal plants studied in aqueous solvent

S.No	Phytochemical compounds	Medicinal plants											
		<i>Calotropis procera</i>			<i>Catharanthus roseus</i>			<i>Ocimum sanctum</i>			<i>Nerium indicum</i>		
		L	S	F	L	S	F	L	S	F	L	S	F
1	Alkaloids	+	+	+	+	+	+	+	+	+	+	+	+
2	Phenols	+	+	+	+	+	+	+	+	-	+	+	+
3	Flavonoids	+	+	+	+	+	+	+	+	+	+	+	+
4	Terpenoids	+	+	+	+	-	+	+	+	+	+	+	+
5	Carbohydrates	-	-	-	+	+	-	+	+	+	+	+	+
6	Reduced sugars	-	-	-	+	+	+	+	+	+	-	-	-
7		L= leaf; S= stem; F= flower.											
8		Present= +; Absent= -											

Table No.3: Phytochemical constituents of four medicinal plants studied in ethanol solvent

S.No	Phytochemical compounds	Medicinal plants											
		<i>Calotropis procera</i>			<i>Catharanthus roseus</i>			<i>Ocimum sanctum</i>			<i>Nerium indicum</i>		
		L	S	F	L	S	F	L	S	F	L	S	F
1	Alkaloids	+	+	+	+	+	+	+	+	+	+	+	+
2	Phenols	+	+	+	+	+	+	+	+	+	+	+	-
3	Flavonoids	+	+	+	+	+	+	+	+	+	+	+	+
4	Terpenoids	+	+	+	+	-	+	+	+	+	+	-	-
5	Carbohydrates	+	-	-	+	+	+	+	+	+	+	+	+
6	Reduced sugars	-	-	-	+	-	-	+	+	+	-	-	-
7		L= leaf; S= stem; F= flower.											
8		Present= +; Absent= -											

Table No.4: Phytochemical constituents of four medicinal plants studied in methanol solvent

S.No	Phytochemical compounds	Medicinal plants											
		<i>Calotropis procera</i>			<i>Catharanthus roseus</i>			<i>Ocimum sanctum</i>			<i>Nerium indicum</i>		
		L	S	F	L	S	F	L	S	F	L	S	F
1	Alkaloids	+	+	+	+	+	+	+	+	+	+	+	+
2	Phenols	-	+	+	+	+	+	+	-	-	+	-	+
3	Flavonoids	+	+	+	+	+	+	+	+	+	+	+	+
4	Terpenoids	+	-	+	+	+	+	+	+	+	-	-	-
5	Carbohydrates	-	-	-	+	+	-	+	+	-	+	+	+
6	Reduced sugars	-	-	-	+	-	-	+	+	-	-	-	-
7		L= leaf; S= stem; F= flower.											
8		Present= +; Absent= -											



C. procera



C. roseus



O. sanctum



N. indicum

Figure No.1: Medicinal plants for screening of phytochemical constituents

CONCLUSION

Screening of the selected four medicinal plants revealed the presence of several phytochemical compounds. Majority of the metabolites were found positive in *Ocimum sanctum* compared to *Catharanthus roseus*, *Calotropis procera*, and *Nerium indicum*. The results obtained could provide wide range of future possibilities for agriculture sectors and crop protection. Although, the selected all four medicinal plants holds phytochemical properties and could play equally important role in retardation of the various plant diseases and microbial pathogens. The future research could be an interesting way for quantitative screening of the phytochemical compounds. Additionally, several other secondary metabolites still need to be explored both qualitatively and quantitatively.

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CONFLICT OF INTEREST

We declare that we have no conflict of interest.

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