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Qualitative Phytochemical Screening of Three Indigenous Medicinal Plants

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ABSTRACT

Many modern medicines had their origin in medicinal plants. The present study was undertaken in three common plants viz; Mangifera indica (Mango), Azadiracta indica (Neem) and Lantana camara which are found to have anti diabetic and other medicinal properties. Pytochemical analyses of the active components of the plants by using different solvents were carried out. The fresh leaves of mango, neem and lantana were collected from the campus of Dr. D. Y. Patil Biotechnology and Bioinformatics Institute, Tathawade, Pune. Methanol, petroleum ether and water extracts of fresh and dry leaves of all the three plants were obtained by standard procedure. Filtered extracts were concentrated and were subjected to qualitative phytochemical analysis for various secondary metabolites like alkaloids, glycosides, steroids, triterpenoids, tannins, saponins and flavonoids. Phytochemical analysis indicated the presence of these constituents in these plants whereas variable results were observed with different solvents used. Phytochemical screening can serve as a basis for proper identification, collection and investigation of the plants. These parameters will be useful in the preparation of the herbal monograph of these plants.

Keywords: Mangifera indica, Azadiracta indica, Lantana camara, Secondary metabolites, phytochemical analysis.

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INTRODUCTION

In India thousands of plant species are known to have medicinal value and the use of different parts of several medicinal plants to cure specific ailments has been in vogue since ancient times. Plants have provided a source of inspiration for novel drug compounds, as plant derived medicines have made large contributions to human health and well being. Traditional medicine using plant extracts continues to provide health coverage for over 80% of the world's population, especially in the developing world (WHO, 2002). The medicinal actions of plants are unique to a particular plant species or group, consistent with the concept that the combination of secondary products in a particular plant is taxonomically distinct [1].

Plants like mango, neem and lantana have been investigated for their various therapeutic properties. Lantana (Lantana camara), belonging to family Verbenaceae, is a genus of about 150 species, mostly native to subtropical and tropical America. It is used in Indian medicine as a sudorific, intestinal antiseptic and diaphoretic besides its employment in the treatment of tetanus, rheumatism and malaria [2, 3]. Phytochemically, the plant has revealed the presence of several triterpenes [4]. Mango is one of the most important tropical plants in the world. Its parts like mango peels, bark, mango pulps and seed kernels are commonly used in folk medicine for wide variety of remedies [5]. However there are very less report about studies on mango leaves. Azadirachta indica is a very useful traditional medicinal plant and each part of the tree has some medicinal properties [6]. The extracts from neem are recommended in ancient medical texts for gastrointestinal upsets, diarrhoea and intestinal infections, skin ulcers and infections, and malaria [7].

Different phytochemicals have been found to possess a wide range of activities, which may help in protection against chronic diseases. Plants, especially used in Ayurveda can provide biologically active molecules and lead structures for the development of modified derivatives with enhanced activity and /or reduced toxicity. Hence the present study was aimed at the preliminary phytochemical screening of the aqueous and organic solvent extracts of the leaves of three indigenous plants, Lantana camara, Mangifera indica and Azadiracta indica.

MATERIALS AND METHODS

Leaves of Azadirachta indica, Mangifera indica, and Lantana camara are collected from the campus of Dr. D. Y. Patil University, Tathawade, Pune. Thoroughly washed fresh leaves (200mg) were extracted individually with methanol, water and petroleum ether (10ml). Qualitative phytochemical analysis was carried out for alkaloids, glycosides, steroids, triterpenoids, tannins, saponins and flavonoids by following the method described by Mace [8], Kokate [9], Salkowski [10] and Sofowora [11].

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RESULTS AND DISCUSSION

The beneficial medicinal effects of plant materials typically result from the secondary products present in the plant although, it is usually not attributed to a single compound but a combination of the metabolites. The result obtained in the phytochemical screening of the plants (Table: 1) varied according to the solvents used for the extraction of the leaves. Methanol extracts of the leaves of Lantana camara showed the presence of all the secondary metabolites studied which would be the active principle of the plant. The presence of flavonoids, glycosides, carbohydrates, proteins, triterpenoids and tannins using methanolic extracts are previously reported [12]. Thus methanol is recommended for the large scale extraction of active principle [13]. Aqueous extracts exhibited the presence of saponins and triterpenoids, whereas petroleum ether extracts showed the presence of flavonoids, glycosides, saponins and steroids. The steroids and saponins are responsible for central nervous system activities [14]. Saponins possess hypocholesterolemic and antidiabetic properties [15]. 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 [16].

Table 1: Phytochemical screening of secondary metabolites from leaves of *Lantana camara, Mangifera indica* and *Azadiracta indica*

Secondary Metabolites		Alkaloids	Flavanoids	Glycosides	Saponins	Steroids	Tannin	Triterpenoids
Plants	**Solvents**							
Lantana camara	Methanol	+	+	+	+	+	+	+
	Water	-	-	-	+	-	-	+
	Petrolium Ether	-	+	+	+	+	-	-
Mangifera indica	Methanol	+	+	-	-	-	+	-
	Water	-	+	-	-	-	-	+
	Petrolium Ether	+	-	+	+	+	-	+
Azadiracta indica	Methanol	-	-	-	-	-	+	-
	Water	-	+	-	-	-	-	-
	Petrolium Ether	-	-	+	+	-	-	+

Methanol extracts of the leaves of Mangifera indica showed the presence of alkaloids, flavonoids and tannins whereas the aqueous extracts indicated flavonoids and triterpenoids. Alkaloids are the most efficient therapeutically significant plant substances. Alkaloids in plants have amazing effects on humans and this has led to the development of powerful pain killer medications [17]. The presence of tannin in the plants implies they may have astringent properties and in addition, could quicken the healing of wounds and burns [18]. In Mangifera, petroleum ether extracts showed positive results for flavonoids, glycosides, saponins and steroids which indicated their solubility. High amount of total phenolics and flavonoids are reported in the ethyl acetate fraction of mango leaves [19].

In Azadiracta methanol and aqueous extracts of the leaves showed the presence of tannin and flavonoids respectively whereas petroleum ether extracts indicated saponins,

glycosides and triterpenoids. This is in agreement with the studies that petroleum ether, chloroform and methanolic extracts of Azadirachta indica were found to contain only glycosides, triterpenes and fatty acids in relatively higher quantities [20]. Ethanolic leaf extracts of Azadiracta is reported to contain alkaloids, flavonoids, saponins, tannins, glycosides and terpenes [21]. The studies indicate that for neem ethanol is a better solvent than the solvents used in the present studies. In neem glycoside appeared to be the major bioactive component that offers antisecretory and antiulcer effects [22]. For Lantana it is showed that methanol is a better solvent than others for the extraction of active substances. Petroleum ether showed the solubility of maximum components studied in mango leaves whereas further studies are required for a better solvent. The study indicates that by using the solvents methanol, petroleum ether and water, the solubility of various active components are higher in Lantana than that of Mangifera and Azadiracta. This explains that the choice of solvent for the extraction of a particular constituent is vital.

Different phytochemicals have been found to possess a wide range of activities, which may help in protection against chronic diseases and are responsible for different therapeutic properties of Azadirachta-indica, Mangifera indica, Lantana camara. These are indigenous plants which are easily available. Solvent system plays an important role in the solubility of phytochemical components in the crude extracts.

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