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## SEARCH FOR HAEMAGGLUTININS IN ETHNOMEDICINALLY IMPORTANT STEM BARKS

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**Abstract:** Lectins are sugar binding proteins or glycoproteins of non immune origin which agglutinates cells and /or precipitate glycoconjugates. Lectins (Haemagglutinins) serve as recognition molecules and are widely used in membrane studies of normal and cancer cells, studies of blood group substances, histochemical and immunohistochemical studies and purification of glycoproteins and polysaccharides. Apart from the role as storage protein, they have role in defense also. Though seeds are the richest source of plant lectins, stem barks of some plants also harbour lectins. This paper presents the results of a screening study to detect the presence of lectins in the bark of some selected medicinal plants which are ethnomedicinally important and are widely being used in our indigenous system of medicine. From the screening study, it has been concluded that the bark of *Saraca asoca*, *Messua ferrea*, *Swietenia macrophylla*, *Trema orientalis*, *Caesalpinia pulcherrima* and *Cassia fistula* contain haemagglutinins whereas the bark extracts of *Polyalthia longifolia*, *Mangifera indica*, *Tectona grandis* and *Bauhinia purpurea* did not show any haemagglutinating activity. Similarly immuno diffusion study revealed that five extract namely *Saraca asoca*, *Messua ferrea*, *Swietenia macrophylla*, *Trema orientalis* and *Caesalpinia pulcherrima* have some affinity to human O<sup>+</sup> serum components forming precipitin bands while others showed no reaction. None of the plant samples exhibited specific affinity to any one of the blood group erythrocytes.

**Key words:** Lectin, Medicinal plant, Bark, Haemagglutinins.

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**Introduction:** Lectins are sugar binding proteins or glycoproteins of non immune origin which agglutinates cells and /or precipitate glycoconjugates. Lectins (Haemagglutinins) serve as recognition molecules and are widely used in membrane studies of normal and cancer cells, studies of blood group substances, histochemical and immuno histochemical studies and purification of glycoproteins and polysaccharides. Apart from the role as storage protein, they have role in defense also. Though seeds are the richest source of plant lectins, stem barks of some plants also harbour lectins. [1]. Agglutination is the most easily detectable manifestation of lectin's interaction with other cells. They can agglutinate human red blood cells also. Hence haemagglutination (Agglutination with erythrocytes) is the tool widely used to detect the presence of lectins in biological sources. Lectins have been reported from different parts of plants. Famous plant lectins are ConA(From *Canavalis*), Wheat germ agglutinin(WGA), Soyabean agglutinin ( SBA) etc. Well-known example of typical bark lectins are those from the elderberry (*Sambucus nigra*) [2]. This study is an attempt to screen the bark of some selected medicinal plants which are ethnomedicinally important and are widely being used in our indigenous system of medicine, for presence of lectins.

**Materials and methods:** The bark of ten selected ethno medicinally important plants were collected from Viswanathan Memorial Herbal Garden maintained at College of Horticulture, Vellanikkara,

Thrissur, Kerala. Samples were cleaned, dried and powdered. One gram samples were ground with 50 ml Phosphate buffered saline (PBS 0.01M; pH 7.4) to get 2% PBS extract and kept at 4° C overnight. Next day these extracts were centrifuged for 30'at 10,000Xg to get a clear supernatant used for screening lectins by haemagglutination assay. Haemagglutination assay was carried out as described by Pueppke ( 1979) on 96 well micro titre plates using PBS washed erythrocytes (2%) of Human A,B and O blood groups and serial double fold dilution of bark extracts [3]. The Haemagglutination titre ( HA titre) was estimated visually after one hour of incubation as the reciprocal of the highest dilution of the extract giving visible agglutination. The interaction of the bark extracts with human O<sup>+</sup> serum components also was studied by doing Ouchterloney's double immuno diffusion technique [4].

**Results and discussion:** The present study was an attempt to detect the presence of lectin activity in the bark extracts of ten selected medicinal plants. These barks are medicinally important and used for the treatment of various ailments in indigenous system of medicine [5]-[6]. The taxonomic classification and other details of the plants used in this study are given in Table.I and the HA activity of the bark extracts against human erythrocytes as well as the interaction of the bark extracts with human O<sup>+</sup> serum components are given in Table.II. HA activity denotes the presence of lectins in the extract.

From the present screening study, it has been concluded that the bark of *Saraca asoca*, *Messua*

*ferrea*, *Swietenia macrophylla*, *Trema orientalis* and *Caesalpinia pulcherrima* and *Cassia fistula* contain lectins (haemagglutinins) whereas the bark extracts of *Polyalthia longifolia*, *Mangifera indica*, *Tectona grandis* and *Bauhinia purpurea* did not show any haemagglutinating (HA) activity. Out of the earlier medicinal applications of lectins, the most important was in distinguishing different blood group erythrocytes. Some lectins show specific affinity to a particular group of human erythrocytes[7]. In our

study none of them showed specific affinity to any particular group of blood cells. Immuno diffusion study revealed that five extract namely *Saraca asoca*, *Messua ferrea*, *Swietenia macrophylla*, *Trema orientalis* and *Caesalpinia pulcherrima* have affinity to human O<sup>+</sup> serum components forming precipitin bands while others showed no reaction. Further, detailed phytochemical research is required to identify the nature of the haemagglutinins present in the barks.

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Table I. Details of the medicinal plants selected for screening study

Sl No:	Botanical name	Local name	Family	Ethno medicinal use of the bark
1	<i>Saraca asoca</i>	Asokam	Caesalpinaceae	In Gynecological disorders
2	<i>Polyalthia longifolia</i>	Bengali asok	Annonaceae	To lower BP, stimulate respiration
3	<i>Messua ferrea</i>	Nagapoo	Calophyllaceae	In Gastritis, Bronchitis
4	<i>Cassia fistula</i>	Kanikkonna	Fabaceae	As blood purifier, immunity enhancer
5	<i>Swietenia macrophylla</i>	Mahagony	Meliaceae	As anti inflammatory
6	<i>Bauhinia purpurea</i>	Mandaram	Caesalpinaceae	In ulcers and wounds
7	<i>Trema orientalis</i>	Amathali	Ulmaceae	In muscular pain
8	<i>Caesalpinia pulcherrima</i>	Rajamalli	Caesalpinaceae	As emmenagogue and abortifacient.
9	<i>Mangifera indica</i>	Aam	Anacardiaceae	As abortifacient, antifertility agent, anti stomach ache
10	<i>Tectona grandis</i>	Thekku, Teak	Verbenaceae	In diarrhoea and stomach ache

Table.II. Haemagglutinating(HA) activity of the bark extracts					
Sl No: Botanical name		HA titre			Precipitin band with O <sup>+</sup> serum
		A	B	O	
1	<i>Saraca asoca</i>	64	64	32	+
2	<i>Polyalthia longifolia</i>	0	0	0	-
3	<i>Messua ferrea</i>	16	32	16	+
4	<i>Cassia fistula</i>	4	8	8	-
5	<i>Swietenia macrophylla</i>	32	32	16	+
6	<i>Bauhinia purpurea</i>	0	0	0	-
7	<i>Trema orientalis</i>	64	32	64	+
8	<i>Caesalpinia pulcherrima</i>	64	64	32	+
9	<i>Mangifera indica</i>	0	0	0	-
10	<i>Tectona grandis</i>	0	0	0	-

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