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ANTI INFLAMMATORY ACTIVITY OF HERBAL FORMULATIONS CONTAINING THE EXTRACTS OF FICUS *BENJAMINA* PLANT

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ABSTRACT

Ficus benjamina is a popular house plant in temperate regions due to its graceful growth and adaptability to a wide range of environmental conditions. It thrives in full sun but can also survive in partial shade. In the summer, it needs a moderate quantity of water, while in the winter, it needs just enough to prevent drying out. Research has demonstrated that *Ficus benjamina* may efficiently remove gaseous formaldehyde from the air in a home. Although the fruit is edible, it is not why the plant is often cultivated. The leaves are very sensitive to subtle changes in illumination. Inflammation, which may be caused by many different things and is currently the biggest health problem, was the driving force for the initiative. The fig tree, or Ficus benjamina, is a valuable medicinal plant. The *Ficus benjamina* voucher specimen SG/KN/3210 was placed in our department after being collected from the area surrounding alwar city and validated by Dr. S. N. Dwivedi, Professor & Head of the Department of Botany at Janata PG College, APS, University in Rewa, Madhya Pradesh. The various extract obtained after extraction were subjected for phytochemical screeningto determine the presence of following various phytochemical present in the extracts. Microscopy and powder microscopy examinations of the stem of Ficus benjamina have shown that it is a dicot stem with an epidermis, hypodermis, pericycle, conjoint and collateral vascular bundle, medullary rays, and a pith. The current investigation aimed to determine whether or not an herbal gel comprising extract from the fig tree (Ficus benjamina) have anti-inflammatory properties.

Keywords: *Ficus Benjamina*, Plant, Medicine, India, Health

Introduction

Natural active chemicals in medicinal plants may be utilised to relieve sickness and discomfort. Traditional medicines and medicinal plants are widely employed as preventative and curative treatments in the majority of underdeveloped countries. WHO reports that in developing countries, 80% of the population uses traditional medicines, mostly herbal plant cures, for primary healthcare. Phytochemicals in plants may have medicinal effects due to their antioxidant, antibacterial, and antipyretic characteristics. Herbs have been widely used by both laypeople and conventional medical practitioners for the treatment of a wide range of conditions due to their perceived safety and efficacy. Neither the general public nor traditional medicine practitioners are aware of the possible toxicity of herbs, despite the fact that multiple cases of herb-related toxicity have been recorded in the scientific literature. More and more people are turning to plants for their medicine needs (Sharma Alok 2008; Bozzuto Anne 2000).

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The World's Largest Botanical Garden, it's possible that India grows more medicinal plants than any other country. Medicinal plants have been employed in some capacity for thousands of years by indigenous medical practises including Ayurveda, Sidha, and Unani. India is home to over one-fifth of the world's estimated 3.6 million medicinal plant species. According to recent studies, almost 70,000 different plants are employed in mainstream medicinal systems (Mehrola, M.N. 1990). Plants were the principal source of treatment for many ancient cultures. Herbal therapy was practised by all civilisations until the advent of modern western medicine, and at first, it was believed that synthetic chemicals were the most effective treatments for treating illness and curing disease.

Many people are rediscovering the therapeutic value of plants as they seek healthier ways of living. Herbalism is making a comeback in today's environmentally conscious and health-conscious culture, and natural products are more widely available than ever before, even in the West. Unlike many modern medications, herbal treatments may have few to no negative side effects.

It has been observed that traditional medical practises are being revived in an effort to improve patient care. People all throughout the world will eventually come to prefer traditional medical practises. Despite substantial evidence supporting contemporary medicine's benefits, some disadvantages have limited its potential moving forwards. Academics have begun looking at ancient and traditional medicine as a possible solution to the problems plaguing modern medical practise (Farasworth, N.R., Pezzuto, J.M. 1983).

MATERIALS AND METHODS

Collection of plant material

The Ficus benjamina voucher specimen SG/KN/3210 was placed in our department after being collected from the area surrounding alwar city and validated by Dr. S. N. Dwivedi, Professor & Head of the Department of Botany at Janata PG College, APS, University in Rewa, Madhya Pradesh.

Preparation of plant powder

The plant was sun-dried, and then machine-dried and roughly crushed. The powder was stored in an airtight container after being passed through a No. 40 sieve.

Physicochemical and Pharmacognostical studies of aerial parts of Ficus benjamina:

The healthy parts of plant samples were preserved by fixing them in FAA solution (5% formalin, 5% acetic acid, and 70% ethyl alcohol, totaling 90 ml). The specimens were dehydrated in a schedule-mandated sequence of tertiary-butyl alcohol concentrations after being fixed for 24 hours. Paraffin wax (melting point 58-600C) was slowly added to the TBA solution in order to penetrate the specimens until supersaturation was obtained. Paraffin blocks were made from moulds of the specimens (Agrawal, S.S and Paridhavi, M. 2007).

Physico-Chemical Analysis

The powdered plant material of Ficus benjamina was subjected to standard procedure for the determination of various physicochemical parameters.

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Phytochemical Screening of Ficus benjamina W. & Ar.:

The various extract obtained after extraction were subjected for phytochemical screeningto determine the presence of following various phytochemical present in the extracts (Mukherjii P.K. 2001).

Determination of ash values

The purpose of determining ash levels is to identify low-quality items, depleted medications, and sandy or earthy substances. Using water-soluble ash and acid-insoluble ash may also serve as a method for identifying chemical components.

RESULTS

Physico-Chemical Analysis

The dried sections of Ficus benjamina were submitted to a conventional process for the evaluation of different physicochemical characteristics, including ash values (total ash, acid insoluble ash, and water-soluble ash), swelling index, moisture content (M.C.), and foreign organic matter (F.O.M.) (Table 1).

Extraction

Water, ethanolic, chloroform, petroleum ether, and ethyl acetate were all used to extract the plant powder. The extract was obtained by distilling the solvents out at low pressure and then vacuum drying the resulting semisolid mass in a rotary flash evaporator. The percentage yields of various extracts are listed in Table 2 (Divakar M C. 2002).

Phytochemical Screening

The resultant extracts were tested phytochemically for first signs of activity. Water, ethanol, chloroform, ethyl acetate, and petroleum ether were used in the extraction process, and the resulting liquid was tested for the presence of several bioactive compounds. The aqueous extract includes several bioactive compounds such alkaloids, carbohydrates, glycosides, tannins, proteins, amino acids, and steroids. Ethanol extract contains alkaloids, carbohydrates, glycosides, tannins, protein, amino acids, and steroids (Hiremanth, S.R.R 2008; Bharath R.,Suryanarayana B. 2009). Carbohydrates and tannins are present in the chloroform extract, whereas alkaloids, carbohydrates, glycosides, proteins, amino acids, and steroids are found in the petroleum ether extract.

Table 1: Physico-chemical analysis of Ficus benjamina

Parameters (% w/w)	**Results**					
	R1	**R2**	**R3**	**X**	**X±SD**	**X±SEM**
Total ash (TA)	7.0532	7.1958	7.0972	7.1154	7.11±0.05	7.11±0.03
Water soluble ash (WSA)	4.9674	4.8260	4.9062	4.8998	4.89±0.05	4.89±0.03

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Acid insoluble ash (AIA)	1.8856	1.8074	1.7988	1.8306	1.83±0.00	1.83±0.00
Moisture content (MC)	6.0	5.79	5.90	5.89666	5.896±0.07	5.89±0.04
Swelling index (SI)	0.21	0.17	0.23	0.203333	0.20±0.02	0.20±0.01
Foreign organic matters (FOM)	0.90	0.87	089	0.88666	0.88±0.10	0.88±0.06

Abbr.: R1=Reading 1, R2=Reading 2, R3=Reading 3, **X**=Mean, SD=Standard Deviation, SEM=Standard Mean Error

Table 2: Extractive value of different extract of Ficus benjamina

Type of Extract	**% Yield (w/w)**	**Color of Extract**
Aqueous extract	2.0947	Light Green
Ethanolic extract	12.7123	Dark Green
Chloroflam extract	10.6321	Light Green
Pet. Ether extract	9.7915	Brownish Green
Ethyl acetate extract	14.6511	Dark Green

Since, the major active constituents are present in ethanolic extract and ethyl acetate extract therefore; the ethanolic and ethyl acetate extract was taken for further investigation. The results are shown in Table 3 (A. A. Rahuman et al 2009).

Table 3: Preliminary phytochemical screening of different extract of Ficus benjamina

Constituents	**Acetonic Extract (AESS)**	**Ethyl Acetate Extract (EAESS)**	**Ethanolic Extract (EESS)**
Carbohydrate	-ve	- ve	+ ve
Glycosides	- ve	- ve	- ve
Fixed oil and fats	+ ve	+ ve	- ve
Proteins and amino acids	- ve	+ ve	+ ve
Saponins	- ve	- ve	- ve

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Phenolic comp. and tannins	- ve	+ ve	+ ve
Phytosterols	+ ve	+ ve	+ ve
Alkaloids	+ ve	+ ve	+ ve
Gums and mucilage	+ ve	+ ve	+ ve
Flavonoids	+ ve	+ ve	+ ve

(+ Present, - Absent)

Pharmacological Screening

In-vitro Anti-inflammatory activity of Extracts of Ficus benjamina

Lysosomal hydrolytic enzymes are generated in sites of inflammation, where they may harm neighbouring organelles and tissues and contribute to a variety of illnesses. Methods were used to test and study pharmaceuticals, chemicals, and herbal preparations for their anti-inflammatory properties and efficacy. Methods like this include those used to examine erythrocyte membrane integrity, lysosomal membrane stability, fibrinolytic tests, platelet aggregation, and the uncoupling of oxidative phosphorylation (respiration-linked ATP production). Stabilisation of erythrocyte membranes exposed to heat and hypotonic-induced lyses was adopted in the present study because of its ease of use and reproducibility. Both ethanolic and ethyl acetate stem extracts of Ficus benjamina were tested in vitro for their anti-inflammatory effects using the human red blood cell (HRBC) membrane stabilisation method. Extraction concentrations of 1, 2, 4, and 6 milligrammes per millilitre were used. Protection of HRBC in hypotonic solution was seen for both EESS and EAESS at 6 mg/ml concentrations, with the former providing 51.4% and the latter providing 68%, respectively (Das K, Dang R, Machale UM, Fatepuri S. 2010). Tables 4 and 5 and Figure 1 show that at a concentration of 2.5 mg/ml, traditional indomethacin provided 69.6% protection. One or more of the extract's phytochemical components may be responsible for the effect. Photomicrographs of the HRBC (Fig.2) confirm the collected findings.

The research also offers good support for the use of Ficus benjamina leaves as an anti-inflammatory drug in traditional medicine. Hence, the plant might be considered a natural source of membrane stabilizers and was capable of offering an alternate therapy for inflammatory-related ailments and diseases (Kumar L, Verma R 2010).

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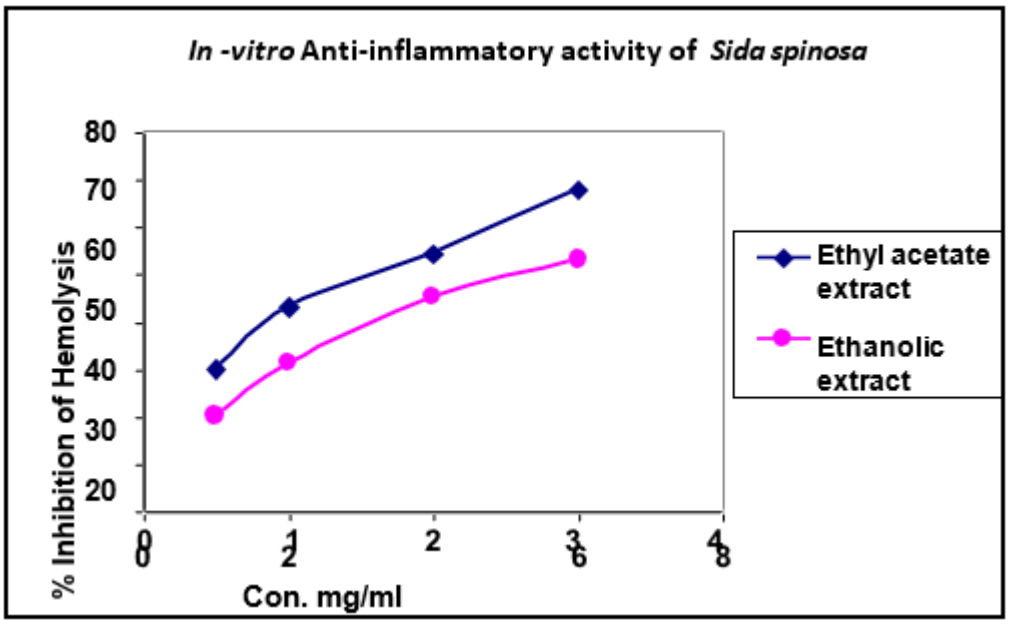

Figure 1: In-vitro Anti-inflammatory activity of Extracts of Ficus benjamina

Table 4: In-vitro anti-inflammatory activity of Ethanolic extract of Ficus benjamina by membrane stabilization method

Treatment	Con(mg/ml)	Absorbance(560nm)	% of Inhibition
Control	-	0.250±0.29	-
Ethanolic extract	1.00	0.208±0.25 [a]	19.8
	2.00	0.182±0.22[a]	31.2
	4.00	0.147±0.28[b]	43.2
	6.00	0.123 ±0.42[c]	51.4
Indomethacin (Standard drug)	2.50	0.070±0.18[b]	69.6

Values are expressed as X (Mean) ±SEM, n=3. (One way ANOVA followed by Student t-test). Statistically significance of [a]P < 0.05, [b]P<0.01, [c]P<0.001 and [d]NS in comparison to respective control.

Table 5: In-vitro anti-inflammatory activity of Ethyl acetate extract of Ficus benjamina by membrane stabilization method

Treatment	Con(mg/ml)	Absorbance(560nm)	% of Inhibition
Control	-	0.250±0.29	-

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Ethyl acetate extract	1.00	0.175±0.12[a]	30.0
	2.00	0.143±0.23[a]	42.8
	4.00	0.115±0.44[c]	54.0
	6.00	0.081±0.39[b]	67.6
Indomethacin (Standard drug)	2.50	0.070±0.18[b]	69.6

Values are expressed as X (Mean) ±SEM, n=3. (One way ANOVA followed by Student t-test). Statistically significance of [a]P < 0.05, [b]P<0.01, [c]P<0.001 and [d]NS in comparison to respective control.

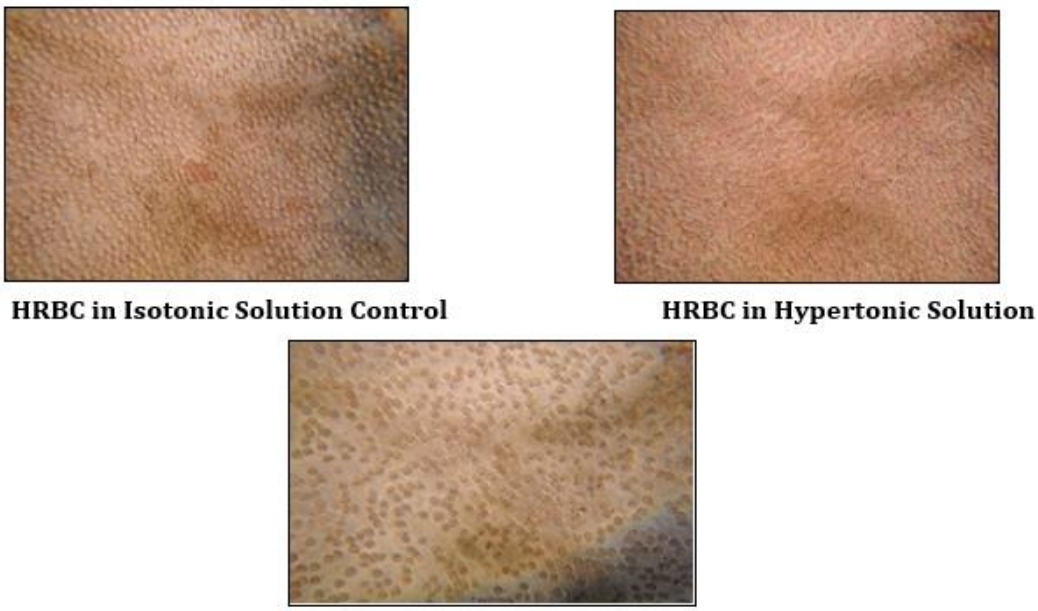

Figure 2: HRBC Membrane in isotonic and hypertonic solution

DISCUSSION

The soxhlet apparatus was used to extract Ficus Benjamin using various solvents such water, acetone, ethanol, chloroform, ethyl acetate, and petroleum ether. Medicinally active components were looked for in the extracts. Based on the results of the physicochemical analysis, it was decided to further investigate the extracts obtained from ethanol and ethyl acetate (Ploeger HE, Takken T, de Greef MH and Timmons BW 2009; Timmerman KL et al 2008). In vitro anti-inflammatory activity of ethanolic and ethyl acetate extract of Ficus Benjamin stem was investigated using the human red blood cell (HRBC) membrane stabilisation technique. Among all extracts and concentrations, ethyl acetate extract 6mg/ml demonstrated the highest anti-inflammatory action, protecting HRBC in hypotonic solution by 68.2 percent, whereas EE extract 6mg/ml protected HRBC by 51.4 percent. Standard indomethacin was used as a comparison drug, and it demonstrated a protection rate of 69.6

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percent (Ashoniya Sheer 2011). One or more of the extract's phytochemical components may be responsible for the observed activity. The research also supports the use of Ficus Benjamin leaves in traditional medicine for their anti-inflammatory properties (Ara Tachjian 2010). The plant was thus a potential alternative therapy for inflammatory illnesses and diseases, and might be considered a natural source of membrane stabilisers. The percentage inhibition of HRBC haemolysis in hypotonic solution of hydrogel containing EE & EAE extract was observed to be around 18% & 31.3% (at 30 min.) & 46.4% & 58.1% (at 240 min.) whereas in hydroalcohalic gel containing EE & EAE it was observed to be around 20% & 35% (at 30 min.) & 52% & 67% (at 240 min. Standard voveran emulgel gel was used as a comparison in all tests (Prakash RP, Rao R. 2010).

CONCLUSION

People prefer natural medicines since they are thought to be less toxic and have fewer adverse effects than synthetic ones. There is a rising need in the marketplace for herbal formulations. The current investigation aimed to determine whether or not an herbal gel comprising extract from the fig tree (Ficus benjamina) have anti-inflammatory properties. There is now a novel topical ethosomal gel containing Ficus Benjamin extract that can be used as an alternative remedy for the management and treatment of inflammation-related disorders and diseases, as all the studies performed provide strong evidence for its use. All optimised formulations using Ficus Benjamin extract have passed stability testing and may be considered for commercialisation. Topical medications are applied to a specific area to produce localised effects due to the medication's ability to penetrate deeper layers of skin or mucous membranes. One major perk of topical delivery methods is that they avoid being metabolised in the liver.

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