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Evaluation of Anti-inflmmatory activity of Udumbara phala (*Ficus glomerata* .Roxb) on Wistar albino rats.

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ABSTRACT

INTRODUCTION: Ayurveda has a lot of remedies for number of disorders. Even though such a huge amount of formulations are there, we are in a need of fast acting and effective Anti-inflammatory drugs in Ayurveda. *Udumbara* is one among the such drugs which is commonly available and highly potential in *Shopha* as it is mentioned in Raja nighantu. The present research work was conducted to see the efficacy of the drug *Udumbara* (*Phala*) on inflammation.

OBJECTIVES: To evaluate the anti-inflammatory activity of *Udumbara phala*

METHDOLOGY:*Udumbara phala* was collected from natural habitat. Macroscopic and microscopic study of the leaf was carried out **.** Pharmacognostic and Phytochemical tests are performed as per the standards of Ayurvedic Pharmacopoeia**.** Anti-inflammatory activity of *Udumbara phala* evaluated in wistar albino rats using Carrageenan induced rat paw edema model. Statistically results were analyzed by using Annova test and dunnet's test.

RESULTS: Phytochemical analysis showed the presence of reducing sugar, monosaccharide's , proteins, steroids, Alkaloids, Tannins in both aqueous and alcoholic extract of *Udumbara phala.* Hexose sugar, flavonoids, Carbohydrates were found in Aqueous extract. Non reducing sugar were found only in ethanolic extract. Anti-inflammatory activity of *Udumbara phala* showed significant reduction in the rat paw edema ($p<0.05$) when compared to Control and Standard group.

CONCLUSION: *Udumbara phala* at the dose of 200mg\kg and 400mg\kg significantly reduced the carrageenan induced rat paw edema ($p<0.05$)in comparison with Control.

KEY WORDS: Udumbara (*Ficus glomerata*.Roxb), Anti-inflammtaory drugs.

Introduction:

Inflammation is a protective response by the body to variety of etiologic agents (infectious non-infectious), while infection is invasion into the body by harmful microbes and their resultant ill-effects by toxins. There are two types of inflammation acute inflammation and chronic inflammation.[1] Inflammation is considered as "KING OF HUMAN MISERIES".[2] There are many acute and chronic inflammatory diseases like Acute pelvic inflammatory disease, chronic inflammatory heart disease. NSAID's are the main line of treatment for the conditions of inflammation but the NSAID's have severe side effect such as gastrointestinal ulceration, perforation, obstruction and bleeding has limited the therapeutic usage of NSAID's inflammatory bowel disease, Rheumatoid arthritis, Psoriasis, Auto immune diseases etc.

There are abundant plants, which are available in Dravyaguna Shastra possessing anti-inflammatory action. *Udumbara (Ficus glomerata* Roxb*)* is one among them and it is easily available. *Udumbara* (*Ficus glomerata* Roxb*)* is known as Cluster fig tree has *Kashaya rasa* S*heeta virya* and *Katu vipaka*, used in diseases like *Shotha* ,*Yoniroga*, , *Medoroga*, *Visarpa*, *Ama* and *Vrana shota* fruit is having *sheeta virya* and *madhura* rasa act as *shrama* and *shopha hara*.[3] In this research work Ethanolic extract of *Udumbara phala* showed significant ($p<0.05$) reduction in Carrageenan induced paw edema at the dose of 200mg\kg and 400mg\kg respectively when compared to control group.

REVIEW OF LITERATURE:

Charakacharya considered Udumbara (*Ficus glomerata* Roxb) under Mutrasangrahaniya mahakashaya varga and in Kashaya skanda.[4] Sushruta considered it under the Nyagrodhadi gana.[5]Ghrita prepared by using *Udumbara* (*Ficus glomerata* .Roxb) in amradivarga.[6] *Vangasena* mentioned *Nyagrodhadigana siddha ghrita* pana in *Shotha chikitsa* where *Udumbara*(Ficus glomerata Roxb) is one of the ingredient.[7]Bhavprakash Nighantu mentioned it in Vatadivarga.[8] The Bark and unripe fruits of *Ficus glomerata* Roxb are carmative, stomachic.[9]

MATERIALS AND METHODS:

Collection of plant material:

The *Phala* of the *Udumbara (Ficus glomerata.Roxb)* plant will be collected from BVVS Herbal Garden Bagalkot. The plant was identified and by Botanist and Dravyaguna faculty.

Preparation of Extract:

Dried powder of *Udumbara phala* (*Ficus glomerata Roxb)* extracted with ethanol by using Soxhlet Apparatus. The ethanol extract of *Udumbara Phala (Ficus glomerata.Roxb)* was used for entire study.[10]

Animals:

Albino Wistar rats of either sex weighing 150-200gm were obtained from BVVS H.S.K college of Pharmacy, Bagalkot, Karnataka. All animals were housed in polypropylene cages (3 In each cage) at an ambient temperature;25±2ºc,relative humidity;55-65%,and were maintained under a 12h light\dark cycle each in animal house. Ethical clearance for this experimental protocol was obtained from Institutional Animal Ethics Committee(IAEC\HSKCOP\May2019\Ayur2).The animals were fed with standard diet and water ad libitum were deprived of food overnight prior to the experiment.

Requirements: Plethysmograph, Carrageenan(1%),Albino Rats, Syringe, Needle, Standard and test drugs, Feeding tube, Mercury, Saline.

Inclusion criteria: Healthy albino rats of both sex weighing 150-250gms

Exclusion criteria: Albino rats of less than 150gms and more than 250gms, infected rats, and pregnant rats will be excluded from the study.

Dose fixation: Through toxicity studies its shown that even 100 times more than therapeutic dose also not having toxic effect, so in general 2000mg\kg is considered as lethal dose 1\5 th (400mg\kg)and 1\10th (200mg\kg) of lethal dose taken for study.

Table showing grouping and dosage of Animals.

Group	Drug	Dose	Route of Administration
Group I	Distilled water	10ml/kg	Oral
Group II	Diclofenac sodium	10mg/kg	Oral
Group III	Ethanolic extract of *Udumbaraphala*	200mg\kg	Oral
Group IV	Ethanolic extract of *Udumbaraphala*	400mg\kg	Oral

Procedure:

The rats of either sex weighing (150-200g) are used in this experiment. The animals are fasted and deprived of water 18hrs prior to the experiment to ensure uniform hydration and to minimize the variability in edematous response. The control rats receive 10ml of distilled water, test group is given oral administration of ethanol extract of *Udumbara phala* in lower dose(200mg\kg) and higher dose(400mg\kg),and the Standard group is given Diclofenac sodium tablet orally. After 1hour the rats are challenged with 0.05ml of 1% carrageenan solution subcutaneously into the plantar side of the left hind paw. The paw is marked with ink at the level of the lateral malleolus and immersed in mercury up to this mark. The paw volume is measured with plethysmograph immediately after injection(0),again after 1/2hr,1hr,3hrs and 5hrs.

Data Analysis:

The data is expressed as mean±standard Deviation(SD).Results were analysed using one-way ANNOVA followed by Dunnet's test. Differences were considered as Statistically significant at P<0.05, when compared with control.

RESULTS:

Table no:3.12 Showing the % of inhibition of volume of Paw oedema at 30min

Groups	Mean	SE of mean	SD	F value	P value
Group I	0.36±0.044	0.044	0.07	6.39	0.016
Groups II	0.18±0.016 (50.00%)	0.016	0.028		
Groups III	0.18±0.048 (52.57%)	0.048	0.083		
Group IV	0.19±0.023 (47.22%)	0.023	0.04		

Graph No : 1 Showing the inhibiton of volume of Paw oedema at 30min

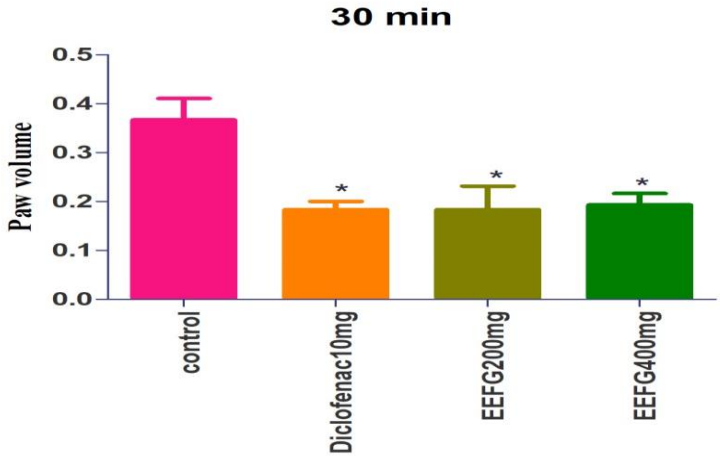


Table no:3.13 Showing the % of inhibition of volume of Paw oedema at 1hr

Groups	Mean	SE of mean	SD	F value	P value
Group I	0.43±0.03	0.03	0.046	22.22	0.0003
Groups II	0.29±0.02 (32.00%)	0.02	0.04		
Groups III	0.1±0.04 (76.00%)	0.04	0.07		
Group IV	0.05±0.04 (88.37%)	0.04	0.07		

Graph No:2 Showing the inhibition of volume of Paw oedema at 1hr

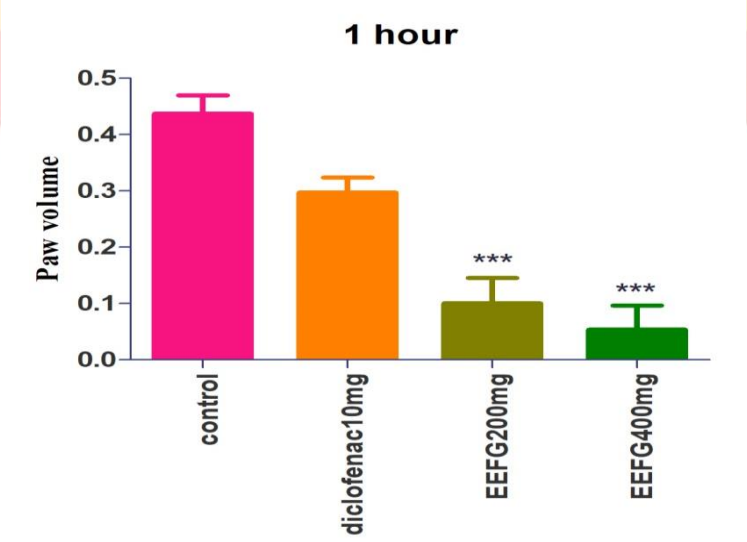


Table no:3.14Showing the % of inhibition of volume of Paw Oedema at 3hr

Groups	Mean	SE of mean	SD	F value	P value
Group I	0.58±0.05	0.05	0.08	8.641	0.0069
Groups II	0.9±0.02 (55.00%)	0.02	0.04		
Groups III	0.19±0.11 (67.24%)	0.11	0.19		
Group IV	0.21±0.06 (63.79%)	0.06	0.13		

Graph No:4 Showing inhibition of volume of Paw Oedema at 3hr

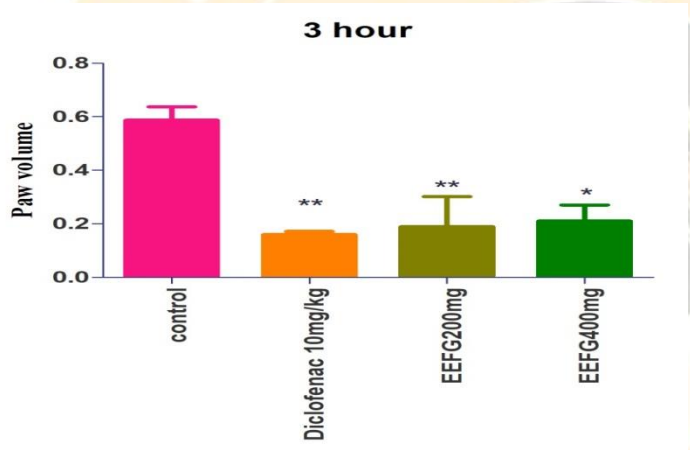


Table no:3.15 Showing the % of inhibition of Volume of Paw Oedema at 5hr

Groups	Mean	SE of mean	SD	F value	P value
Group I	0.64±0.05	0.05	0.09	11.38	0.0029
Groups II	0.14±0.05 (78.12%)	0.05	0.09		
Groups III	0.26±0.09 (59.37%)	0.09	0.16		
Group IV	0.28±0.03 (56.25%)	0.03	0.06		

Graph no:5. Showing the inhibition of Volume of Paw Oedema at 5hr

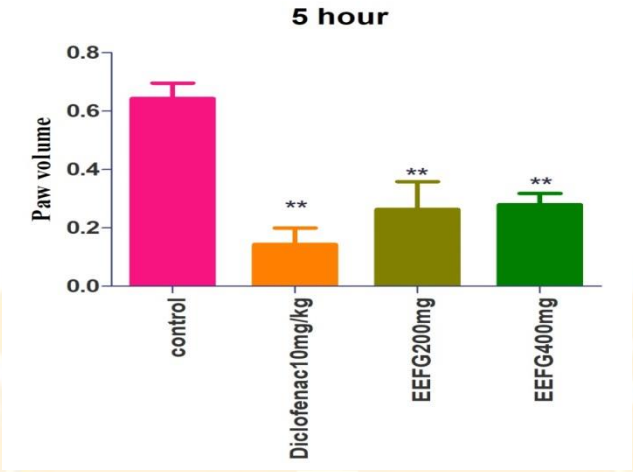
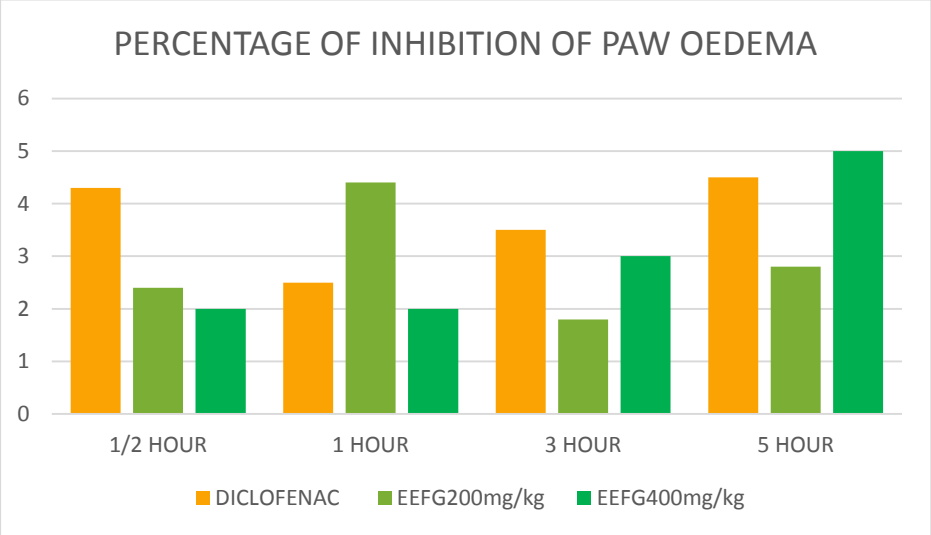


Table no:3.16 Showing Effect of ethanol extract of *Udumbara* (*Ficus glomerata* . Roxb) phala on carrageenan induced paw edema volume in Wistar albino rats

Groups	**Volume(ml) of Paw edema (Percentage of edema inhibition)**			
	½ Hr	1Hr	3hr	5hr
Control-distilled water(Group-I)	0.36±0.044	0.43± 0.03	0.58 ± 0.05	0.64± 0.05
Diclofenac 10mg/kg (Group-II)	0.18±0.016* (50%)	0.29± 0.02 (32%)	0.9± 0.02** (55%)	0.14±0.05** (78.12%)
EEFG200mg/kg (Group-III)	0.18±0.048 * (50%)	0.1± 0.04*** (76%)	0.19± 0.11** (67.24%)	0.26± 0.09** (59.37%)
EEFG400mg/kg (Group-IV)	0.19±0.023 * (47.22%)	0.05± 0.04*** (88.37%)	0.21 ± 0.06* (63.79%)	0.28 ± 0.03** (56.25%)

All the values are expressed as Mean± SEM, n=6, One way Analysis of Variance (ANOVA) followed by multiple comparison dunnet'stest . *p<0.05, **p<0.01, ***p<0.001 as compared to the control group .

Graph No-06 Showing percentage of inhibition of Paw Oedema



Results

Anti-inflammatory activity was performed by carrageenan induced paw edema method. In this study the standard drug diclofenac (10mg/kg) showed significant anti-inflammatory activity ($p<0.05$ –$p<0.001$) by decrease in paw edema 0.18±0.016 (50%), 0.9± 0.02(55%) and 0.14±0.05 (78.12%) at ½ hr, 3 hr and 5 hr respectively as compared to control group. At the same the ethanol extract of *Udumbara* 200mg/kg showed significant anti-inflammatory activity ($p<0.05$ –$p<0.001$) by decrease in paw edema 0.18±0.048 (50%),0.1± 0.04 (76%), 0.19± 0.11 (67.24%) and 0.26± 0.09 (59.37%) at ½ hr, 1 hr, 3 hr and 5 hr respectively as compared to control group. In contrast the ethanol extract of *Udumbara* 400mg/kg showed significant anti-inflammatory activity ($p<0.05$ –$p<0.001$) by decrease in paw edema 0.19±0.023 (47.22%) , 0.05± 0.04 (88.37%) , 0.21 ± 0.06 (63.79%) and 0.28 ± 0.03 (56.25%) at ½ Hr, 1 Hr, 3Hr and 5Hr respectively as compared to control group.

DISCUSSION:

Among different *Prayojya Angas* mentioned in classic that are *Twak*, *Patra*, *Phala*, *Kshree*. Majority of the studies were undertaken on bark and only few were on other parts. Hence this research work meant to evaluate the efficacy of Fruit of *Udumbara* in inflammation**.** The result showed that the *Udumbara* drug(EEFG) in both doses i.e 200mg\kg and 400mg\kg

started to show significance at 1\2 hr only and it was peak at 1hr,then gradually decreased at 3h and 5hrs. This drug showed efficacy with the dose of 200mg\kg which is maintained same even for 400mg\kg which was similar to that of 400mg\kg, this shows that the efficacy of drug is not dose dependent. This shows that the test drug in both doses are effective and also have more significance in acute inflammation.

CONCLUSION:

Udumbara phala showed significant reduction in the Carargeenan induced edema at the dose of 200mg\kg and 400mg\kg respectively when compared to Control group($P<0.05$)

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