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EVALUATION OF ANTI-INFLAMMATORY ACTIVITY OF *FERULA ASAFOETIDA LINN* EXTRACT IN ALBINO RATS

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ABSTRACT

Inflammation is a localized reaction that produces redness, warmth, swelling, pain due to infection, irritation, and/or injury. Inflammation can be external or internal. *Ferula Asafoetida Linn* [Family: Umbelliferae] has been used, as anti - inflammatory agent in traditional system of medicine in India. However, there are no reports about its scientific validation for the claimed activity. **Results:** Preliminary photochemical investigation of the hydroalcoholic extract of *Ferula Asafoetida Linn*rootreveals the presence of carbohydrates, proteins, alkaloids, flavonoids, phytosterols, tannins and volatile oils. In group of carrageen an induced paw edema in rats, there is highly significant decreased paw volume when treated with Diclofenac (1 ± 0.**) and high dose of *Ferula Asafoetida*root extract (1.666 ± 0.333**) in the comparison with controlled animals (3.333±0.333). This comparison was found to be highly significant ($p<0.01$). In this method, there was significant decreased paw volume when treated with low dose of *Ferula Asafoetida Linn*root extract (2±0) in the comparison with control animals (3.333±0.333). This comparison was found to be significant ($p<0.05$). **Conclusion:** The present investigation revealed that, the *Ferula Asafoetida Linn*root extract at high and low doses produces highly significant and significant decreased in carrageenan induced paw edema in rats. This activity may be due to presence of flavonoids, phytosterols and tannins in extract.

KEYWORDS

Ferula Asafoetida, Carrageenan, Paw edema, Hydroalcoholic extract, and Anti-inflammatory.

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INTRODUCTION

Inflammation

Inflammation is a localized reaction that produces redness, warmth, swelling, and pain due to infection, irritation, and/or injury. Inflammation can be external or internal. [1]Edema formation, leukocyte infiltration and Granuloma formation represent such components of inflammation[2].

Etiology[1]

The causing agents for inflammation are Burns, Chemical irritants, Frostbite, Toxins, pathogens, Physical injury, penetrating, Immune reactions due to hypersensitivity, Ionizing radiation, Foreign bodies, dirt, debris and Trauma.

Currently used Anti- inflammatory drugs are associated with some severe side effects like Gastric irritation, Anorexia, Diarrhea, Leucotrins, Rashes, Stomach ulcers, GIT bleeding, Kidney damage, Liver damage, Hypertension etc[3].

Hence, there is an increasing demand for the alternative therapies, particularly herbal therapies that are believed to be effective, safe and economical. Ferula asfoetidalinn, Family: Umbelliferae is cultivated in many parts of India. The seeds are acrid, pungent in taste, antiflatulent, appetizing, digestive, asthma and bronchitis, antimicrobial, woophing cough, anti-inflammatory, contraceptive, antibacterial. They are useful in antiepileptic, repelling spirits, antiarthritic, expectorant, antiseptic, mild sedative, analgesic, muscle relaxtant, anti helmintic, hypotensive, mental disorders. The leaves are antibacterial, diuretic and laxative[4].

However, there is no authentic scientific data reported regarding anti-inflammatory activity of Ferula asfoetidalinn seed. In this context, in the present study an attempt is proposed to evaluate the anti-inflammatory activity of Ferula asfoetidalinn seed extract in rats.

REVIEW OF LITERATURE

Ferula asafetida Linn.

Family: Umbelliferae

Other Names: Giant Fennel, Heeng and Hing.

Description

Asafoetida, is the gum resin prized as a condiment in India and Iran, is obtained chiefly from plant Ferula asafetida. The Latin name ferula means "carrier" or "vehicle". Asa is a "resin ", and foetidus means "smelling, fetid". A related species (F.vulgaris) native to the Mediterranean, is mentioned in the Greek mythology.

Proved activities of Asafoetida

Anti-Bacterial Activity, Anti-Microbial Activity, Anti-Fungal Activity, Anti-Oxidative Activity, Anti-Helmintic Activity, Anti-Depressant Activity, Pro-Apoptic Ativity, Anti-Tumoral Activity, Larvicidal Activity

METHODOLOGY

Preparation of hydro alcoholic extract[5]

The powder of *Ferula Asafoetida Linn* roots was charged in to the thimble of a Soxhlet apparatus and extracted using 70% ethanol and 30% water for 18 hrs. Appearance of colorless solvent in the siphon tube was the indication of exhaustive extraction and based on that, further extraction was terminated. The terminated extract was transferred into the previously weighed empty beaker and evaporated to get as a thick paste on the water bath, maintained at 50^{o}C to get alcoholic extract. The extract was finally air dried thoroughly to remove all traces of the solvent and the percentage yield was calculated. The perfectly dried extract was then stored in an air tight container till used.

Evaluation of Anti-Inflammatory Activity

Carrageenan induced Hind paw edema in Albino Wistar rats

Albino Wistar rats of either sex weighing 150– 200 g were maintained in animal house and they were divided in to 4 groups of 6 animals each. Prior to the experimentation they were acclimatized to housing conditions for at least one week period of time to adjust to the new environment providing with food and water and *ad libitum.*

Grouping and treatment

Group I------- Control, animals were treated with 10% Tween-80 *p.o*

Group II------- Standard group, animals were treated with 10mg/kg Diclofenac sodium.

Group III-----Animals were treated with 30mg/kg b wt. *p.o* of hydro alcoholic extract of ferula *Asafoetida Linn*

Group IV----- Animals were treated with 60mg/kg b wt. *p.o* of hydro alcoholic extract of Ferula Asafoetida *Linn*

Procedure

After 60 minutes of the respective treatments, Carrageenan (0.1ml of 1% w/v) was injected into sub plantar region of right hind paw. Paw volume was measured every hourly interval for a maximum of six hours by using mercury plethysmograph.

Reduction in the paw volume was compared with the vehicle control[6].

RESULTS

Acute Oral Toxicity Study

For the LD_{50} dose determination, hydro alcoholic extract of Ferula Asafoetida Linn was administered up to dose 2000 mg/kg body weight and extract did not produce any mortality, thus $1/5^{th}$, $1/10^{th}$, $1/20^{th}$ of maximum dose tested were selected for the present study.

LD_{50} of Hydro alcoholic extract of Ferula Asafoetida Linn was found to be –2000 mg/kg.

Table No.1.2: The classic signs and symptoms of acuteinflammation[1]

S.No	English	Latin
1	Redness	*Rubor**
2	Swelling	*Tumor**
3	Heat	*Calor**
4	Pain	*Dolor**
5	Loss of function	*Functiolaesa***

Table No.1: Nature and Percentage yield of the extract

S.No	Name of the Extract	Nature	Colour	%Yield (% w/w) in g.
1	Hydro alcoholic extract	Sticky	Yellowish	23.2 %

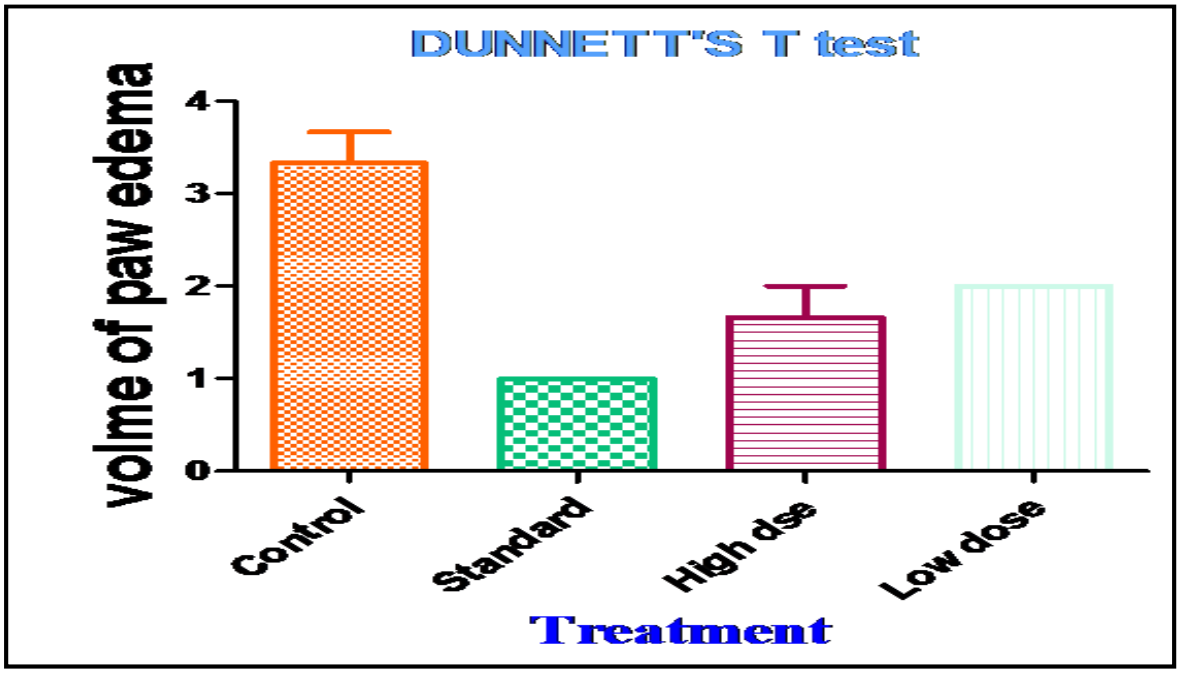
Table No.2: Effect of Hydro Alcoholic Extract of *Ferula Asafoetida Linn* on Carragenan Induced Paw Oedema in Rats AT 0 min, 30min, 1hr, 2 hrs and 4 hrs

S.No	Group	Animal	0 min	30 min	1 hr	2 hrs	4 hrs
1	Control	Head	4 mm	4 mm	4 mm	4 mm	4 mm
		Body	3 mm	3 mm	4 mm	4 mm	3 mm
		Tail	3 mm	4 mm	4 mm	4 mm	3 mm
2	Standard	Head	4 mm	4 mm	3 mm	2 mm	1 mm
		Body	4 mm	3 mm	3 mm	2 mm	1 mm
		Tail	3 mm	4 mm	3 mm	2 mm	1 mm
3	High dose 400mg/kg	Head	3 mm	4 mm	4 mm	3 mm	1 mm
		Body	4 mm	4 mm	4 mm	2 mm	1 mm
		Tail	3 mm	4 mm	3 mm	2 mm	2 mm
4	Low dose 100mg/kg	Head	4 mm	3 mm	3 mm	2 mm	2 mm
		Body	3 mm	3 mm	4 mm	3 mm	2 mm
		Tail	4 mm	3 mm	3 mm	2 mm	2 mm

Table No.3: Evaluation of Anti-Inflammatory Activity of *Ferula asafoetida linn* in rats at 4 hours

S.No	Treatment	Paw Edema Volume(mm)	Mean ± SEM
1	Control	4	3.333 ± 0.333
		3	
		3	
2	Diclofenac (10mg/kg)	2	1 ± 0.**
		1	
		1	
3	F.A.H (400mg/kg)	1	1.666 ± 0.333**
		1	
		2	
4	F.A.L (100mg/kg)	2	2 ± 0*
		2	
		2	

Values are Mean ± SEM (n=3), statistical analysis followed by Dennett's T test.
Where, * represents significant at $p<0.05$,
** represents very significant at $p< 0.01$ when compared to Control group.
F.A.H (400 mg/kg) and F.A.L (100 mg/kg) are the high and low doses of Ferula Asafoetida Linn.



SUMMARY

In traditional systems of Ayurvedic medicine Ferula Asafoetida Linn is a well-known plant drug used for its Anti-inflammatory activity. The present study was planned to explore the possible Anti-inflammatory activity of root extract of Ferula Asafoetida Linn fruits were powdered and subjected to extraction with solvent, ethanol and water in the ratio (70:30) using Soxhlet apparatus.

Preliminary photochemical studies indicate the presence flavonoids, phytosterols and tannins in extract.

Acute oral toxicity (LD_{50}) of Ferula Asafoetida Linn were determined in female wistar rats as per OECD guidelines No.425 up to dose levels of 2000 mg/kg and it was found that Ferula Asafoetida Linn was non-toxic even at 2000mg/kg dose and no mortality was recorded. Hence the experimental doses were 1/5 and 1/20 of LD_{50} i.e., selected as 400 and 100mg/kg respectively as high and low doses.

For the evaluation of anti-inflammatory activity, Male or female Sprague-Dawley rats with a body weight between 100 and 150 g are used. The animals are starved overnight. To insure uniform hydration, the rats receive 5 ml of water by stomach tube (controls) or the test drug dissolved or suspended in the same volume. Thirty minutes later, the rats are challenged by a subcutaneous injection of 0.05 ml of 1% solution of carrageenan 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 plethysmographically immediately after injection, again 30 min, 1h, 2h, and 4h.

In the treatment of carrageenan induced paw edema in rats, showed highly significant decreased paw volume when treated with Diclofenac(1±0) and high dose of Ferula Asafoetida Linn extract (1.666 ± 0.333**) in the comparison with controlled animals (3.333±0.333). This comparison was found to be highly significant ($p<0.01$).

In this method, there was significant decreased paw volume when treated with low dose of Ferula Asafoetida Linn extract (2±0) in the comparison with control animals (3.333±0.333). This comparison was found to be significant ($p<0.05$).

These results suggests that, Ferula Asafoetida Linn extract possesses clinically applicable anti-inflammatory activity further, this study also indicates that Ferula Asafoetida Linn fruits extract is useful in overcoming the carrageenan induced paw edema in rats.

CONCLUSION

The present study was carried out to find out the evaluation of anti-inflammatory activity of Ferula Asafoetida Linn in rats.

From the results we concluded that the Ferula Asafoetida Linn extract at high and low doses produces highly significant and significant decreased in carrageenan induced paw edema in rats. The Anti-Inflammatory activity might be due to presence of flavonoids, Phytosterols and Tannins in Ferula Asafoetida extract. However, long term studies in different animals and inflammation subjects may further substantial our study result.

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CONFLICT OF INTEREST

We declare that we have no conflict of interest.

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