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ANTIPYRETIC AND ANTI-INFLAMMATORY ACTIVITIES OF TEPHROSIA PURPUREA ROOT EXTRACTS

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ABSTRACT

The present study deals with the investigation of the ethanol, ethyl acetate, chloroform and petroleum ether extracts of Tephrosia purpurea root and were assessed for its antipyretic activity using 20% Brewer's yeast induced pyrexia model and anti-inflammatory activity using 1% Carrageenan induced paw edema in albino rats of both sexes. Animals were divided into ten groups each consisting of six animals. Group 1 served as control and Group 2 received standard drug. Group 3 to Group 10 were assigned for our investigation. Group 3 and Group 4 received Tephrosia purpurea root ethanol extract of 250 mg/kg and 500 mg/kg. Group 5 treated with ethyl acetate extract 250 mg/kg and Group 6 treated with 500 mg/kg ethyl acetate extract of Tephrosia purpurea root. Group 7 received 250 mg/kg chloroform extract and Group 8 received 500 mg/kg chloroform extract of Tephrosia purpurea root. Group 9 injected with petroleum ether extract 250 mg/kg and Group 10 received 500 mg/kg petroleum ether extract of Tephrosia purpurea root. The determination of antipyretic and anti-inflammatory activities all the extracts of Tephrosia purpurea root have proved their antipyretic and anti-inflammatory activities. Ethanol extract of 500 mg/kg possessed higher antipyretic activity as that of the standard paracetamol drug and also higher anti-inflammatory activity than diclofenac sodium drug.

Key words: *Tephrosia purpurea, Antipyretic, Anti-inflammation, Carrageenan and Brewer's yeast.*

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INTRODUCTION

Plants that are recognized by people for their reliable and effective medicinal values are

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commonly used in treating and preventing specific ailments and diseases and play an essential role in health care.

In Aurvedic literature *Tephrosia purpurea* is given as of “Sarwa wran vishaaha” which means that it has the property to cure all types of wounds [1]. The roots are useful in inflammation, skin diseases, scrofula, elephantiasis, dyspepsia, stomachalgia, flatulence, haemorrhoids, asthma, bronchitis, anaemia, hepatosplenomegaly, verminosis, strangury, dysmenorrhoea, chronic fever, boils, pimples, odontalgia and gingivitis.

In traditional Indian medicine, *Tephrosia purpurea* is a common ingredient of formulations for liver ailments and used for different remedies such as bilious febrile attacks, liver and splenic affections, cirrhosis, hepatitis, piles, syphilis and gonorrhoea. It is considered beneficial for liver, kidney, and spleen disorders [2, 3, 4, 5].

The aim of the present study is to evaluate the antipyretic and anti-inflammatory activities of the different extracts of roots of *Tephrosia purpurea* against the Brewer's yeast induced pyrexia model for antipyretic and Carrageenan induced paw edema model in albino rats for anti-inflammatory activities

MATERIALS AND METHOD

Plant material

The roots of *Tephrosia purpurea* were collected in and around Kadayannallur in Tirunelveli District, Tamilnadu, India. It was cleaned with running tap water to remove the adhering elements, shadow dried, size reduced and powdered in a domestic mixer.

Drugs and reagent

Diclofenac sodium (standard for anti-inflammatory), Paracetamol (standard for antipyretic) carrageenan, Brewer's yeast of SD fine grade were used. The various solvents such as ethanol, ethyl acetate, chloroform and petroleum ether of SD fine grade were distilled at their boiling point and used.

Animals used

For the antipyretic and anti-inflammatory activities, albino rats of Wister strain (110-200 gm) maintained in SB College of Pharmacy animal house were used. Animals were housed in standard polypropylene cages and kept under controlled

room temperature ($25 \pm 20^\circ\text{C}$) in a 12 hours light-dark cycle. The animals were fed on standard laboratory animal diet (Amruth animal feed company, Sangli, Maharashtra) and the animals were fasted overnight before the experiment. All the experimental protocols were approved by the Committee for the Purpose of Control and Supervision on Experiments on Animals (CPCSEA), animal ethics committee vide number SPCP/2009-2010/IAEC/CPCSEA/10.

Plant extraction [6]

The powdered roots of *Tephrosia purpurea* were extracted by using ethanol, ethyl acetate, chloroform and petroleum ether in soxhlet apparatus by standard procedure. The distillate were collected and distilled separately to yield various extracts residues. These extracts were used for determination of antipyretic and anti-inflammatory activities.

Antipyretic activity

Determination of antipyretic activity [7, 8, 9]

Antipyretic activity was evaluated by Brewer's induced pyrexia model in albino rats. Albino rats were fasted overnight before the experiment. Pyrexia was induced by injecting subcutaneously 20% w/v brewer's yeast suspension (10 ml/kg,) into the animals' dorsum region. After 18 hours of injection, the rectal temperature of each albino rat was recorded using a digital tele thermometer (Inco, Chennai). Only rats that showed an increase in temperature of at least $0.5-1^\circ\text{C}$ were selected for the experiment. Animals were divided into ten groups each consisting of six animals. Group-1 served as control which received normal saline (1 ml/kg. p.o.), Group-2 received standard drug paracetamol 33 mg/kg p.o., Group-3 to group 10 received ethanol, ethyl acetate, chloroform and petroleum ether extracts of *Tephrosia purpurea* roots of 250 and 500 mg/kg p.o. respectively. The temperature was recorded at 1 hr, 2hr, 3hr and 4hr after drug administration and the values were listed in the Table -I.

Antipyretic activity**Table- I.** Antipyretic activity of *Tephrosia purpurea* root extract by brewer's yeast induced pyrexia model in albino rats

Drug treatment	Dose mg/kg	Rectal temperature(°C)		Rectal temperature after administration of drug(°C)				Total reduction in temperature (°C)
		Normal	18h after yeast administration	1 hour	2 hour	3 hour	4 hour	
Control Saline	1 ml/kg	37.78 ± 0.1091	38.75 ± 0.0866	38.85 ± 0.0866	38.93± 0.0854	39.03±0 .0854	39.1± 0.1080	-
Standard paracetamol	33	37.03± 0.2287	38.08± 0.2057	37.85± 0.2057***	37.58± 0.1931**	37.25±0 .2102***	37.05± 0.2466**	1.03
Ethanol extract	250	38.35± 0.1708	39.3± 0.1472	39.13± 0.1493 ^{ns}	38.95± 0.1443 ^{ns}	38.8± 0.1683 ⁿ _s	38.6± 0.1871*	0.70
	500	37.55± 0.1041	38.6± 0.0913	38.33± 0.0630**	38.03± 0.1031**	37.83± 0.1031**	37.58± 0.125**	1.04
Ethyl acetate extract	250	37.45± 0.1443	38.4± 0.1816	38.18± 0.0854***	37.98± 0.1250**	37.83±0 .1250***	37.73± 0.125**	0.67
	500	37.03± 0.0854	38.05± 0.0645	37.85± 0.0645***	37.65±. 0645***	37.45± 0.0289*	37.25± 0.0630*	0.77
Chloroform extract	250	36.95± 0.0645	37.93± 0.1031	37.75±.1 190***	37.6± 0.0913*	37.4± 0.0913*	637.28 ± 0.0854*	0.65
	500	36.55± 0.1323	37.6± 0.0816	37.45± 0.1041***	37.28± 0.0854*	37.03± 0.1031*	36.85± 0.1708*	0.75
Petroleum ether extract	250	37.58± 0.1493	38.3± 0.1826	38.18± 0.1750***	38.03± 0.2016*	37.93± 0.2016*	37.73± 0.2016*	0.57
	500	37.03± 0.0629	38.08± 0.0854	37.85± 0.0645***	37.65± 0.05***	37.5± 0.0408*	37.35± 0.0289*	0.73
OneWay Anova								
F		17.8010		20.3676	24.8804	19.1333		
df		(9,30)		(9,30)	(9,30)	(9,30)		
P		<0.01		<0.01	<0.01	<0.01		

Data are expressed as Mean ± SEM, n = 6 in each group, Statistical analysis done by one way ANOVA followed by Dunnett's t test. ***P<0.001 **P<0.01 *P<0.05 ns- non significant Vs control.

Anti-inflammatory activity**Carrageenan induced paw oedema model^[10].**

Carrageenan-induced hind paw edema is the standard experimental model of acute inflammation. Carrageenan is the phlogistic agent of choice for testing anti-inflammatory drugs as it is not known to be antigenic and is devoid of apparent systemic effects. Moreover, the experimental model exhibits a high degree of reproducibility.

Carrageenan-induced edema is a biphasic response. The first phase is mediated through the release of histamine, serotonin and kinins whereas, the second phase is related to the release of prostaglandin. Animals are divided into ten groups each consisting of six animals. Group-1 served as control which received normal saline 1

[ml/kg,(p.o.)], Group-2 received standard drug Diclofenac sodium[10 mg/kg (p.o.)], Group-3 to group-10 received ethanol, ethyl acetate, chloroform and petroleum ether extracts of *Tephrosia purpurea* roots of 250 and 500 mg/kg p.o. respectively. Acute inflammation was produced by sub plantar injection of 0.1 ml of 1% suspension of carrageenan in normal saline, in the right hind paw of the albino rats. One hour after oral administration of the drugs, the paw edema was measured with the aid of a standard plethysmometer (Inco, Chennai) at 0, 1, 2, 3 and 4 hours after the injection of carrageenan. The difference between the readings at time 0 hour and the different time intervals was taken as the thickness of edema. The change in the paw edema volumes were given in Table-II.

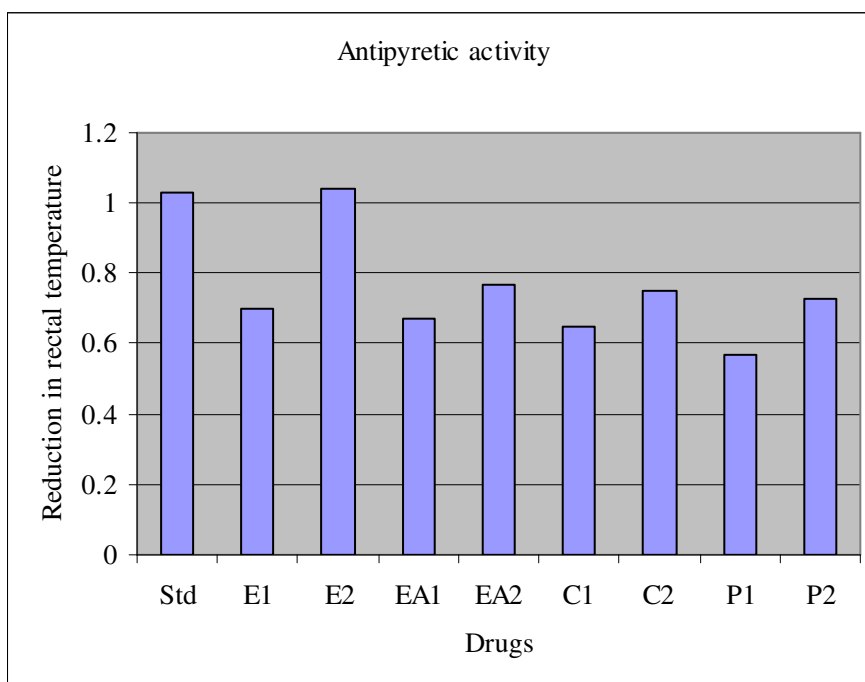
Table- II. Anti-inflammatory activity of *Tephrosia purpurea* root extracts on carrageenan - induced paw edema in albino rats

Drug Treatment	Dose mg/kg	Mean paw volume (ml) ± SEM			
		I Hour	2 Hours	3 Hours	4 Hours
Control Saline	1 ml/kg	0.34 ± 0.0082	0.72 ± 0.0082	0.88 ± 0.0141	1.12 ± 0.0116
Standard Diclofenac Sodium	20	0.26 ± 0.0082* (23.53)	0.46 ± 0.0082* (36.11)	0.66 ± 0.0082* (25)	0.74 ± 0.0082* (33.93)
Ethanol extract	250	0.21 ± 0.00173* (35.24)	0.295 ± 0.025* (59.02)	0.415 ± 0.025* (52.84)	0.58 ± 0.0316* (48.21)
	500	0.19 ± 0.0130* (44.12)	0.265 ± 0.0096* (63.19)	0.365 ± 0.0096* (58.52)	0.535 ± 0.0096* (52.23)
Ethyl acetate extract	250	0.325 ± 0.0096 ^{ns} (4.41)	0.435 ± 0.0096* (39.58)	0.64 ± 0.0082* (27.27)	0.835 ± 0.0096* (25.45)
	500	0.31 ± 0.0058 ^{ns} (8.82)	0.42 ± 0.0082* (41.67)	0.545 ± 0.005* (38.07)	0.76 ± 0.0082* (32.14)
Chloroform extract	250	0.35 ± 0.0129 ^{ns} (2.94)	0.48 ± 0.0082* (33.33)	0.665 ± 0.0096* (24.43)	0.875 ± 0.0096* (21.88)
	500	0.28 ± 0.0082* (17.65)	0.32 ± 0.0082* (55.56)	0.54 ± 0.01634* (38.64)	0.645 ± 0.0096* (42.41)

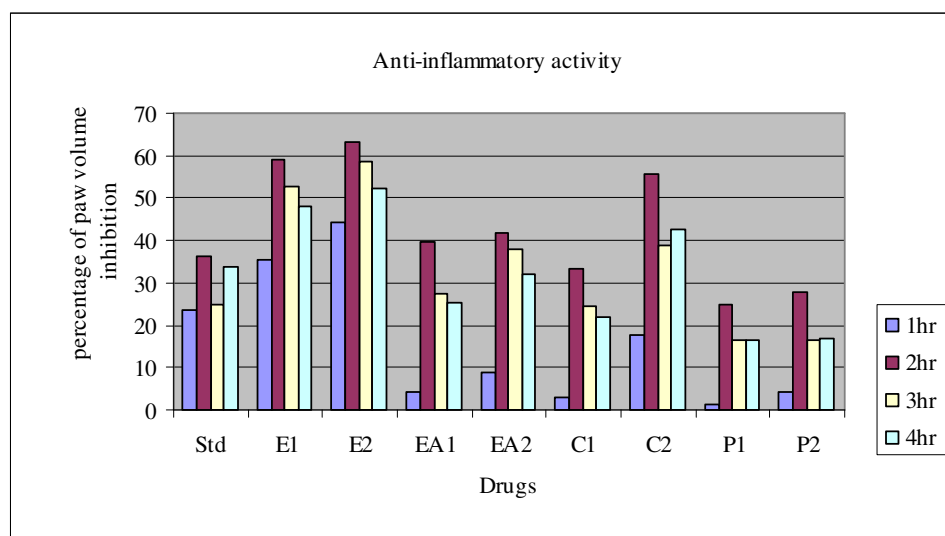
PET ether extract	250	0.345 ± 0.0096 ^{ns} (1.47)	0.54 ± 0.0142* (25)	0.735 ± 0.0096* (16.48)	0.935 ± 0.0096* (16.51)
	500	0.325 ± 0.005 ^{ns} (4.41)	0.52 ± 0.0082* (27.78)	0.735 ± 0.0096* (16.48)	0.93 ± 0.0129* (16.96)
OneWay Anova					
F		30.2326	129.285 7	149.15	171.4663
df		(9,30)	(9,30)	(9,30)	(9,30)
P		<0.01	<0.01	<0.01	<0.01

Data are expressed as Mean ± SEM, n=6 in each group. Statistical analysis done by one way ANOVA followed by Dunnett's t test. *P<0.001, ns-non significant Vs control. The number in the parenthesis indicates the percentage inhibition of anti-inflammatory activity.

Figure- I Antipyretic activity of *Tephrosia purpurea* root extract by brewer's yeast induced pyrexia model in albino rats



Std- standard paracetamol drug, E1- 250 mg/kg of ethanol extract, E2- 500 mg/kg of ethanol extract, EA1- 250 mg/kg of ethyl acetate extract, EA2- 500 mg/kg of ethyl acetate extract, C1- 250 mg/kg of chloroform extract, C2- 500 mg/kg of chloroform extract, P1- 250 mg/kg of petroleum ether extract, P2- 500 mg/kg of petroleum ether extract.

Figure- II Anti-inflammatory activity of *Tephrosia purpurea* root extracts on carrageenan - induced paw edema in albino rats

Std- standard diclofenac sodium drug, E1- 250 mg/kg of ethanol extract, E2- 500 mg/kg of ethanol extract, EA1- 250 mg/kg of ethyl acetate extract, EA2- 500 mg/kg of ethyl acetate extract, C1- 250 mg/kg of chloroform extract, C2- 500 mg/kg of chloroform extract, P1- 250 mg/kg of petroleum ether extract, P2- 500 mg/kg of petroleum ether extract. From our investigation for the antipyretic activity, the following in formations were arrived.

The percentage inhibition of inflammation was calculated for each dose at different hours as given below. $Percentage\ inhibition = [(Vc - Vt) / Vc] * 100$
Where Vc = volume of paw oedema in control animals

Vt = volume of paw edema in treated animals

Statistical analysis

All the values are expressed as mean \pm standard error mean(SEM) and analyzed by using one way ANOVA and Dunnett's t test. Difference between the groups were considered significant at $p < 0.001$ levels.

Ethanol extract

The result showed that there was a dose dependent decrease in the rectal temperature range from 39.15 to 38.6 for 250 mg/kg of and from 38.33 to 37.58 for 500 mg/kg. After four hours higher activity was observed for ethanol extract at 500 mg/kg by possessing total reduction in rectal temperature of $1.04^{\circ}C$ with a probability < 0.001

Ethyl acetate extract

Ethyl acetate extract's dose dependent decrease in the rectal temperature range from 38.18 to 37.73 for 250 mg/kg and from 37.85 to 37.25 for 500 mg/kg. After four hours higher activity was observed for ethyl acetate extract at 500 mg/kg by possessing total reduction in rectal temperature of $0.77^{\circ}C$ with a probability < 0.001

mg/kg. After four hours higher activity was observed for 500 mg/kg by possessing total reduction in rectal temperature of $0.77^{\circ}C$ with a probability < 0.001

Chloroform extract

The dose dependent decrease in the rectal temperature range from 37.75 to 37.28 for 250 mg/kg and from 37.45 to 36.85 for 500 mg/kg of chloroform extract. After four hours appreciable activity was observed for 500 mg/kg ($0.75^{\circ}C$, $p < 0.001$).

Petroleum ether extract

The dose dependent decrease in the rectal temperature range from 38.18 to 37.73 for 250 mg/kg and from 37.85 to 37.35 for 500 mg/kg. After four hours Petroleum ether extract at 500 mg/kg possessed a total reduction in rectal temperature of $0.73^{\circ}C$ with a probability < 0.001

Among the different extracts of *Tephrosia purpurea* root ethanol extract of 500 mg/kg possessed higher antipyretic activity after four hours of drug administration.

Anti-inflammatory activities of *Tephrosia purpurea* root extract on carrageenan- induced paw edema in albino rats were given in Table II and graphically

represented as Figure II. The following results were observed,

Ethanol extract

The observation showed that there was a dose dependent increase in the paw edema volume range from 0.21 to 0.58 for 250 mg/kg and from 0.19 to 0.535 for 500 mg/kg. Ethanol extract at 500 mg/kg after two hours have shown higher percentage of inhibition 63.19% with a probability<0.001.

Ethyl acetate extract

For 250 mg/kg increase in the size of the paw edema volume range from 0.325 to 0.835 and for 500mg/kg from 0.31 to 0.76. Ethyl acetate extract of 500mg/kg after two hours have shown the percentage of inhibition 41.67% with a probability<0.001.

Chloroform extract

The dose dependent decrease in increase in the size of the paw volume range from 0.35 to 0.875 for 250 mg/kg and from 0.28 to 0.645 for 500mg/kg were observed. Chloroform extract of 500 mg/kg after two hours have shown the percentage of inhibition 55.56% with a probability<0.001.

Petroleum ether extract

For 250 mg/kg ,the increase in the size of the paw volume range from 0.345 to 0.935 and for 500mg/kg from 0.325 to 0.93. Petroleum ether extract of 500mg/kg after two hours have shown 41.67% as percentage of inhibition with a probability<0.001. Among these four extracts, ethanol extract of 500 mg/kg possessed higher anti-inflammatory activity after two hours of drug administration.

CONCLUSION

Our investigation of antipyretic and anti-inflammatory activities of different extracts of *Tephrosia purpurea* root have revealed that ethanol extract of 500 mg/kg, possessed higher antipyretic activity as that of the standard paracetamol drug and also higher anti-

inflammatory activity (63.19%) than the markedly available standard anti-inflammatory drug diclofenac sodium drug(33.93). Hence this ethanol extract (500 mg/kg) of *Tephrosia purpurea* root may be finding its importance as antipyretic and anti-inflammatory drugs.

REFERENCES

1. Beshpande SS, Shan GB, Parmar NS. Anti Ulcer activity of *Tephrosia purpurea* in rats. Indian Journal of Pharmacology 35, 2003, 168-172.
2. Dymock W, Warden CJH, and Hopper D . In; pharmacographia India., A History of Vegetable Origin, Delhi Periodical Experts, Delhi, 1976,415.
3. Kirtikar KR and Basu BD. in; Indian Medicinal plants, Delhi Periodical Experts, Delhi,1975,724.
4. Nadkarni KM, In; India Materia Medica. Popular prakashan Pvt.Ltd., Bombay,1989,561.
5. Plea GI and Hewitt WR. Edn., in; Toxicology of liver, Raven press,New York,1982,103.
6. Ramakrishnan PN, Palanisamy S, Extraction and Galenicals, pharmaceuticals-1 ED.9 Jai publishers, Madurai, 2004, 82-85.
7. Niazi J, Vikas Gupta V, Chakarborty P,Kumar P; Anti-inflammatory and antipyretic activity of aleuritis moluccana leaves Asian Journal of Pharmaceutical and Clinical Research , Vol.3 Issue 1, January- March, 2010, 35-37.
8. Vogel H.G,"Drug discovery and evaluation",2nd edition,772.
9. Hajare S W, Chandra S, Tandan S. K., Sharma J, Lal J,Telang A G; Analgesic and antipyretic activity of Dalbergia Sissoo Leaves Indian Journal of Pharmacology 2000, 32, 357-360
10. Winter CA, Risley EA, Nuss CW. Carrageenan induced edema in hind paw of rat as an assay for anti-inflammatory drugs. In: Proc. Soc. Exp. Biol.Med.11,1962,544-547.
