



**ANTI-PYRETIC ACTIVITY OF METHANOLIC EXTRACT OF
PICRORRHIZA KURROA ROYLE EX. BENTH**

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ABSTRACT

Picrorrhiza kurroa (Scrophulariaceae) is a small perennial herb growing in the hilly parts of the north-Western Himalayas region in India and Nepal. The objective of the present study was to evaluate and compare antipyretic activity of *Picrorrhiza kurroa* royle ex. Benth by using 2, 4-Dinitro Phenol (DNP), D-Amphetamine and brewer's Yeast induced pyrexia models. Paracetamol was used as the standard drug to compare the test results. The test extract showed significant antipyretic activity ($p < 0.05$) which justify its use in ethnomedicine.

KEYWORDS: *Picrorrhiza kurroa*, antipyretic activity, 2, 4-Dinitro Phenol, D-Amphetamine, brewer's Yeast induced pyrexia, Paracetamol.



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INTRODUCTION

Picrorrhiza kurroa royle ex. Benth belonging to the family Scrophulariaceae is a small perennial herb that is widely distributed in the north – West India on the slopes of Himalayas between 3000 and 5000mts^{1,2}. *Picrorrhiza kurroa* is an important herb in the traditional Ayurvedic system of medicine and has been used to treat liver and brochial problems. Other traditional uses include treatments of dyspepsia, bilious fever, chronic dysentery and scorpion sting. The most important active constituents of *Picrorrhiza kurroa* are the cucurbitacin glycosides, apocyanin, drosin, iridoid glycosides, picrosides and kutkin^{3,4}. *Picrorrhiza kurroa* has hepatoprotective effect against Amanita poisoning⁵, Carbon tetra chloride⁶ and Aflotoxin B₁ poisoning⁷. Bioactivity of *Picrorrhiza kurroa* established its anti-inflammatory⁸, immunomodulatory⁹ and hydrochoretic effect in rats and dogs¹⁰ and antiviral activity on vaccine virus¹¹.

MATERIALS AND METHODS

Plant collection, identification and authentication

The plant specimen was collected from S.V University, Tirupati, India and identified as *Picrorrhiza kurroa* Royle ex. Benth. Belonging to the family Scrophulariaceae, Voucher No: SDIP, Ref No: 002 dated 26/10/2012 and authenticated by Dr.Madhavachetty, Botanist, Tirupati. The rhizomes of the plant were dried in vacuum oven at 40° C.

Preparation of plant extract

Rhizomes of *Picrorrhiza kurroa* plant are coarsely powdered and are successively extracted by continuous hot percolation method using Soxhlet apparatus employing methanol followed by distillation to recover the excess solvent. Methanolic extraction yielded sufficiently good quantity of the product. The extract was later subjected to drying and stored in a for further use¹². The extract is soluble in water. Therefore, from the dried methanolic extract, accurately 300mg/ml and 500mg/ml solutions were prepared using distilled water.

Standard used for the activity

Paracetamol was used as the standard drug to compare the test results. It was prepared in the concentration of 100 mg/kg in distilled water as the solvent.

Animals used for the study

Adult male albino rats (150-180 gms) were used for the study and kept at the laboratory animal house of Sree Dattha Institute of Pharmacy for acclimatization to laboratory environment. They were kept in well cross ventilated room at 27±2°C for 1 week before the commencement of experiment. Animals were provided with commercial rodent pellet diet and water ad libitum. Experiments were carried out as per the rules and regulations of CPCSEA.

Evaluation of Antipyretic activity

2,4Dinitro phenol (DNP) induced pyrexia

Adult male albino rats (150 – 180gms) were fasted for 24hrs but allowed water ad libitum was used for the experiment. They were randomized into groups of six rats each. 2, 4-DNP (10mg/kg, i.p.) was administered to the rats after obtaining the basal rectal temperatures. Hyperthermia developed within 30min of DNP administration. Different doses of extract (300, 500 mg/kg, i.p.), Paracetamol (100mg/kg) and distilled water (10ml/kg, orally) were administered respectively to the treatment and control groups of animals. Rectal temperatures of the animals were obtained at an hour interval for 4hrs¹³.

D-Amphetamine induced pyrexia

Adult albino rats (150 – 180gms) were fasted for 24hrs but allowed water ad libitum was used for the experiment. They were randomized into groups of six rats each. Amphetamine (5mg/kg, i.p.) was administered to the animals after obtaining basal temperatures. Hyperthermia developed 30minutes following Amphetamine administration. The extract (300, 500 mg/kg, i.p.), Paracetamol (100mg/kg) and distilled water (10ml/kg, orally) were administered to the animals at peak hyperthermia. Rectal

temperatures were obtained at 1hr interval for 4hrs¹³.

Brewer's yeast induced pyrexia

Adult albino rats (150 – 180gms) were fasted for 24hrs but allowed water ad libitum were used for the experiment. They were randomized into groups of six rats each. At zero hour, the basal temperature of the rats was taken using digital clinical thermometer. Therefore each animal was administered subcutaneously with 20% w/v aqueous suspension of yeast at a volume of 10ml/kg¹³. At suitable intervals beginning one hour after yeast injection, rectal temperature of the animals were taken an animals with increase

in 1°C were grouped for the study. The test extract understudy was administered i.p. after the pyrogen at the dose of 300 and 500 mg/kg to respective groups of rats. The control group received distilled water (10ml/kg) and the reference group was administered with paracetamol (100mg/kg) both intraperitoneally. The rectal temperatures of the groups were taken at 1hr interval for 4hrs.

Statistical Analysis

Data was expressed as Mean ± Standard error of mean (SEM) and statistical analysis was carried out by one way analysis of variance (ANOVA) followed by Dunnett's t test.

Table 1
Effect of methanolic rhizome extract of *Picrorhiza kurroa* on 2, 4 DNP induced pyrexia

Groups	Dose (mg/Kg)	Basal temperature	Time interval (h)				
			0hr	1hr	2hr	3hr	4hr
Control	--	35.00 ± 0.19	37.45 ± 0.12	37.65 ± 0.47	39.13 ± 0.33	38.23 ± 0.27	38.18 ± 0.27
Paracetamol	100	36.85 ± 0.53	37.84 ± 0.47	39.29 ± 0.28	38.45 ± 0.51	39.43 ± 0.37	37.90 ± 0.47
MRPK	300	36.65 ± 0.16	37.45 ± 0.23	37.53 ± 0.27	37.76 ± 0.33	37.54 ± 0.25	37.62 ± 0.28
MRPK	500	37.67 ± 0.24	37.54 ± 0.35	37.47 ± 0.46	37.65 ± 0.28	37.98 ± 0.29	37.42 ± 0.14

Results are expressed as Mean ± SEM; n=5 in each group; p<0.05, MRPK is methanolic extract of *picrorhiza kurroa*

Table 2
Effect of methanolic rhizome extract of *Picrorrhiza kurroa* on D-Amphetamine induced pyrexia

Groups	Dose (mg/Kg)	Basal temperature	Time interval (h)				
			0hr	1hr	2hr	3hr	4hr
Control	--	36.44 ± 0.24	37.54 ± 0.24	37.92 ± 0.17	38.00 ± 0.22	38.32 ± 0.24	38.59 ± 0.27
Paracetamol	100	37.17 ± 0.20	37.48 ± 0.26	37.67 ± 0.23	37.70 ± 0.18	37.53 ± 0.17	37.28 ± 0.16
MRPK	300	36.33 ± 0.15	37.23 ± 0.28	37.34 ± 0.25	37.17 ± 0.23	37.13 ± 0.26	37.06 ± 0.17
MRPK	500	36.78 ± 0.14	37.20 ± 0.21	37.55 ± 0.17	37.66 ± 0.25	37.49 ± 0.22	37.24 ± 0.19

Results are expressed as Mean ± SEM; n=5 in each group; p<0.05, MRPK is methanolic extract of *picrorrhiza kurroa*

Table 3
Effect of methanolic rhizome extract of *Picrorrhiza kurroa* on Brewer's yeast induced pyrexia

Groups	Dose (mg/Kg)	Basal temperature	Time interval (h)				
			0hr	1hr	2hr	3hr	4hr
Control	--	38.37± 0.09	39 ± 0.3651	39 ± 0.365	40 ± 0.856	40.17±0.654	39 ± 0.8165
Paracetamol	100	37.45±0.15	38.17± 0.654	37.17±0.654	37 ± 1.065	37.67±1.202	37.17±0.6009
MRPK	300	37.45±0.15	40 ± 1.238	38.33±0.802	38.67 ±0.333	37.50±0.7638	37.00±0.5774
MRPK	500	37.40±0.12	38.5±1.310	37 ± 0.5774	37.33 ±0.614	37.50±0.4282	37.00±0.5774

Results are expressed as Mean ± SEM; n=5 in each group; p<0.05, MRPK is methanolic extract of *picrorrhiza kurroa*

RESULTS AND DISCUSSION

The % yield of methanolic extract of rhizomes of *Picrorrhiza kurroa* after 24hrs of hot percolation was found out to be 34%. The preliminary phytochemical screening showed

the presence of carbohydrates, glycosides, saponins, steroid like phytochemical constituents. Cucurbitacins, Phenolic, Iridoid glycosides are some of the principle

constituents responsible for various pharmacological activities. Iridoid glycosides like kutkin, Picroliv, Picrisides I, II, III & IV, Kutkosides are the chemical moieties that may be responsible for Antipyretic activity¹⁴. The test extract demonstrated significant dose-dependent lowering of temperature in 2, 4-DNP induced pyretic rats. The antipyretic effect was however more pronounced at the 4thhr with the highest dose of the extract. The effect was comparable to that of the standard drug paracetamol. Administration of the extract to D-Amphetamine and Brewer's yeast induced pyretic rats also demonstrated significant lowering of temperature

contributing for its anti-pyretic activity in a dose-dependent manner. Further studies have been planned to isolate the chief active principle and to establish the mode of action of anti-pyretic activity.

ACKNOWLEDGEMENT

Authors express their sincere gratitude to the management, Directors of Sree Dattha Institutions for their timely support in providing us the necessary facilities for carrying out the research work.

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