Analgesic and antipyretic activities of Curcuma longa rhizome extracts in Wister Rats

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Abstract

The study was carried out to ascertain analgesic and antipyretic activities of rhizome extracts of *Curcuma longa* in Wister rats. Both aqueous and alcoholic extracts at 100 and 200 mg/kg by oral, single dose treatment for seven days revealed significant difference (P<0.05, 0.01) in reaction time in terms of analgesic activity before and after treatments which was comparable to analgin (10 mg/kg b wt.) and were ineffective in reversal of brewers yeast induced pyrexia. Solvent yield of these extracts was 20 percent and color dark brown and reddish brown with solid and semisolid consistency respectively.

Key words: *Curcuma longa* (rhizome) extracts, yield, analgesic, antipyretic, rats, oral.

Introduction

The rhizome of *Curcuma longa* Linn. (Family: Zingiberceae) has esteemed medicinal properties and uses referred in Ayurveda. It is one of the important ingredient of food recipes in Indian cuisine under spices and condiments and sacredly used by Hindu women. Rhizome is useful in the treatment of diabetics, hemorrhoids, anemia, jaundice, cough, asthma, wound healing, colic, gout, renal calculi, poisoning, freckles, skin and neurological disorders (Kirtikar and Basu, 1967). Folklore claims to relieve pain sensation and cure bruises by external application (Sharma, 2003). The decoction is valuable in disorders of blood internally, fresh juice in purulent conjunctivitis, catarrh, reliving pain. Leaves are considered as antipyretic (Chopra et al., 2002). *C. longa* is being used in cosmetic herbal formulation viz. Vico turmeric, JCICM-6 and many others. Wide therapeutic applications, medicinal properties and uses of *C. longa* were considered to find out physicochemical properties of rhizome extracts for analgesic**,** antipyretic activities in wister rats.

Materials and methods

Plant materials: Rhizome of *Curcuma longa* was procured from local market. It was shade dried and authenticated by the botanist of Dr. Punjabrao Deshmukh Krishi Vidyapeeth, Akola. Shade dried rhizome were powdered with help of electric grinder and subsequently used for alcoholic hot extraction using soxhelt's apparatus. Aqueous hot extract was obtained after boiling the contents in one liter chloroform water (0.1% v/v) on heating mentle. The solvent was evaporated under laminar air flow. Percent extractability was found to be 20 respectively.

Chemicals and drugs: Ethanol (99% v/v), analgin (10 mg/ml) and acetoaminophen (50 mg/ml) were standard quality chemical and drugs used in this study.

Experimental animals: Thirty six wistar rats of either sex, weighing approximately 150-200 g were procured from Department of Biochemistry Laxminarayan Institute of Technology College, Nagpur University, Nagpur (M.S.) were maintained on pellet diet at room temperature in the department of veterinary Pharmacology, Nagpur Veterinary College, Nagpur. Drinking water was given ad lib. After acclimatization to the experimental conditions for a week period these animals were divided into six groups, each group was comprised of six rats of either sex. Prier to start of the experiment these animals were fasted and employed in this study. The experimental protocol was approved from institutional animal ethics committee of postgraduate institute of veterinary & animal sciences, Akola.

Screening of analgesic activity: Groups I was received normal saline in equivalent doses as that of treatment group was served as untreated control. Group II received analgin @10mg/kg dose was kept as positive control for comparison. Group III, IV, and V VI were administered with aqueous and alcoholic extracts at 100 and 200 mg/kg dose levels as 10 % suspension in 3 % gum acacia (@ 1 ml/200 gm body weight) orally and served as treatment groups. Tail

immersion method described by Ghosh (1984) was followed for screening analgesic activity. Increase in mean reaction time in seconds at every 30, 60 and 90 minutes intervals before and after treatment was considered as analgesic activity of the extracts.

Screening of antipyretic activity: For screening antipyretic activity same groups of animals and their respective treatments were followed, where group II animals was received Paracetamol (10mg/kg) instead of analgin was served as positive control for comparison. Experimental pyrexia induced with 15% suspension of brewers yeast in 2 % gum acacia in normal saline was given 0.25 ml/100gm dose as per the method described by Bhalla *et al.* (1971). The rectal temperature before and after treatment was recorded with the help of digital clinical thermometer at every hour up to three hours was compared with control.

Statistical analysis: The data of this study was statistically analyzed using FRBD and was considered as significant at 5% and 1% level (Snedecor and Cochran, 1967).

Results and Discussion

Analgesic activity: The mean reaction time before (2.93 ± 0.22 minutes) and after treatment (3.26 ± 0.25 to 3.95 ± 0.24 minutes) were highly significant (P< 0.05, 0.01) there was dose and time dependent increase in reaction time (Table 1). The aqueous extract at 200 mg/kg dose was showed increase in mean reaction time which was significantly higher compared to other extracts. Increase in mean reaction time by analgin in group T2 was significantly higher (4.31 ± 0.43 minutes) than both aqueous and alcoholic extracts and its activity was comparable to aqueous extract at above dose level. The alcoholic extract at 100 and 200 mg/kg were showed similar increased in reaction. Increase in mean reaction time by both extracts were highly significant compared to control showing analgesic activity of these extracts where analgin (10 mg/kg) was found to be most potent and effective than aqueous and alcoholic extracts might be due suppression of prostaglandins (Hajare et al., 2000). Dose dependent analgesic activity of curcuminols following intra-peritoneal administration in writhing and capsaicin and formalin rat model has been reported by Navarro *et al.* (2002). Prolonged reaction time to radiant heat stimulation and reduced number of writhing episode following JCICM-6 (polyherbal formulation containing *Curcuma longa*) in mice was reported by Zhou *et al.* (2006). The analgesic activity *C. longa* rhizome powder extract in human was observed by Jaiswal *et al*. (2004). Above reports are in agreement with our findings.

Antipyretic activity: Average normal (98.46 ± 0.17) and pyretic (101.82 ± 0.06) rectal temperature of was significantly different (P<0.05, 0.01). Initial rise of temperature after 18 hrs of yeast injection (2.96 ^{0}F to 3.78 ^{0}F), was reported by Hajare *et al.* (2000) which corresponds to the findings observed in our study. The mean pyretic rectal temperature following treatment with aqueous at 100 and 200 mg/kg by single oral treatment in group T3 and T4 groups were non significant where as in group T2, T5 and T6 were significantly different from untreated control group (T1).The alcoholic extract at same dose level as above in group T5 and T6 were significant (P<0.05,0.01) than untreated control. Antipyretic activity of the above extracts were significant in group T4 and T6 where it was non significant in group T3 and T5 compared to paracitamol reference standard drug (Group T2) but pyretic rectal temperature did not appeared to be normal at 0 hours showing non significant antipyretic activity of above extracts. There was significant difference between initial pyretic rectal temperature (0hrs) and subsequent time intervals where paracetamol appears to be more potent in reversal of pyrexia.

Percent yield of aqueous and alcoholic extract was found to be 20 each. The extracts were dark brown and reddish brown with solid and semisolid in consistency respectively.

Conclusion

The present study concluded that *Curcuma longa* (rhizome) extracts at 100 and 200 mg/kg by single oral dose treatment had analgesic effect but no antipyretic effect. In support to folklore claims for cure of wound, inflammation, pain and associated conditions where “Haldi” is used could be justifiable.

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Table-1.Antipyretic activity of rhizome extracts of Curcuma longa L. in wistar rats.

Tr.Gr.	Treatment and dose	Rectal Temperature (^{0}F)					
		-18 hrs	0 hr	1 hr	2 hr	3 hrs	Average± SE
T1	Control (NS)	98.10 ± 0.17	101.45 ± 0.04	101.25 ± 0.04	101.21 ± 0.03	101.35 ± 0.02	100.67 ± 0.06
T2	Paracitamol (10mg/kg)	98.53 ± 0.28	101.85 ± 0.07	101.10 ± 0.05	101.10 ± 0.04	101.1 ± 0.02	100.7* ± 0.09
T3	Aqueous (100mg/kg)	98.7 ± 0.24	101.9 ± 0.07	101.4 ± 0.04	101.3 ± 0.06	101.4 ± 0.03	100.94**,a ± 0.09
T4	Aqueous (200mg/kg)	98.95 ± 0.13	101.91 ± 0.05	101.5 ± 0.01	101.5 ± 0.04	101.6 ± 0.02	101.09**,b ± 0.05
T5	Alcoholic (100mg/kg)	98.25 ± 0.11	101.83 ± 0.03	101.6 ± 0.06	101.5 ± 0.05	101.4 ± 0.04	100.92*,a ± 0.06
T6	Alcoholic (200mg/kg)	98.22 ± 0.10	102.0 ± 0.07	101.7 ± 0.01	101.7 ± 0.01	101.7 ± 0.05	101.06*,b ± 0.05
	Average ± SE	98.46 ± 0.17	101.82 ± 0.06	101.43 ± 0.04 **	101.39±0.04 **	101.43±0.03**	

Value are mean ± SE, n=6, *,a =non-significant, **,b=Significant For Treatment df (5,20) (P< 0.05, 01) F (cal) 4.08 (2.71, 4.1), CD: 0.25 For period: df (4,20) (P< 0.05, 01) F (cal) 321.74 (2.87, 4.43), CD: 0.23

Table-2. Analgesic activity of rhizome extracts of Curcuma longa L. in wistar rats.

Gr.	Treatment and dose	Reaction time (Seconds)				Total
		Initial (0 min)	30 min	60 min	90 min	
T1	Control (NS)	3.72 ± 0.17	3.52 ± 0.17	3.82 ± 0.17	4.18 ± 0.18	3.81± 0.17
T2	Analgin(10mg/kg)	3.58 ± 0.39	3.98 ± 0.46	4.67 ± 0.47	5.0 ± 0.41	4.31**± 0.43
T3	Aqueous (100mg/kg)	2.4 ± 0.11	2.67 ± 0.15	3.08 ± 0.15	3.33 ± 0.13	2.87**,b ± 0.14
T4	Aqueous (200mg/kg)	2.85 ± 0.25	3.53 ± 0.24	3.8 ± 0.23	4.02 ± 0.25	3.55**,b ± 0.24
T5	Alcoholic (100mg/kg)	2.37 ± 0.21	2.92 ± 0.20	3.22 ± 0.22	3.62 ± 0.23	3.03**,b ± 0.22
T6	Alcoholic (200mg/kg)	2.67 ± 0.24	2.93 ± 0.25	3.22 ± 0.25	3.57 ± 0.22	3.10**,b ± 0.24
	Total	2.93 ± 0.23	3.26**,a ± 0.24	3.64**,a ± 0.25	3.95**,a ± 0.24	

Value are mean ± SE, n=6, **,a, b highly significant For Treatment: df (5,15) (P< 0.05, 01) F (cal) 36.85584 (2.9, 4.56), CD: 0.273557, For Blocks: df (3,15) (P< 0.05, 01) F (cal) 35.66921(3.49, 5.42), CD: 0.223358

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