Print ISSN: 2319-2003 | Online ISSN: 2279-0780

IJBCP International Journal of Basic & Clinical Pharmacology

DOI: http://dx.doi.org/10.18203/2319-2003.ijbcp20170814

Original Research Article

Evaluation of analgesic activity of turmeric (*Curcuma longa* Linn.) in Wister rats

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Received: 28 December 2016
Accepted: 01 February 2017

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ABSTRACT

Background: NSAIDs like Aspirin etc. are randomly used for mild to severe types of pain but long-term and injudicious use of NSAIDs lead to a number of side effects. The present study is designed for exploring the analgesic potential of *Curcuma longa* Linn (Turmeric) in albino rats, which may widen the therapeutic horizon for the said agent.
Methods: Ethanolic extract of Curcuma longa in the doses 100, 200 and 400mg/kg is given orally to 6 Wister rats against a control of normal saline and a standard using Aspirin (300mg/kg) and the animals were subjected to Eddy's hot plate test at different time intervals i.e., 30, 60, 90 and 120 minutes after administration of the drugs and the parameters were noted.
Results: The analgesic activity of Curcuma longa showed significant ($p<0.05$) increase in mean basal reaction time in Hot plate method when compared to the control (Normal saline). As the dose of the ethanolic extract of Curcuma longa was gradually increased from 100, 200 and 400mg/kg respectively, the analgesic activity significantly increased (<0.05). Effect of curcuma longa at a dose of 400mg/kg is found to be comparable with Aspirin.
Conclusions: The results of this study suggest that turmeric (Curcuma longa) has significant analgesic activities in rats.

Keywords: Analgesic, Curcuma longa, Hot plate experiment, Turmeric

INTRODUCTION

Curcumin, a member of the ginger family Zingiberaceae; (1,7-bis [4-hydroxy-3-methoxyphenyl] -1,6- heptadiene-3,5-dione) is a hydrophobic polyphenol compound. It is found in the rhizome of the herb *Curcuma longa* Linn., which is commonly known as turmeric.[1] Turmeric is widely used in therapeutic preparations against anorexia, rhinitis, herpes zoster, acne, cough, urinary tract diseases, diabetic wounds, hepatic disorder, rheumatism and sinusitis.[1-3] Curcumin has several properties including antioxidant, antimicrobial, anti-inflammatory, antiviral, anti-carcinogenic and anti-diabetic activities.[4-9] Recent studies have shown that curcumin also suppresses neuropathic pain induced by chronic sciatic nerve ligation.[11]

Commonly NSAIDs are randomly used for mild to severe types of pain but long-term and injudicious use of NSAIDs lead to a number of side effects like peptic ulcerations, asthma, abdominal pain, abnormal liver functions tests, renal insufficiency etc.[10] So, there has been a continuous search for a better alternative to NSAIDs, which will suppress the symptoms of pain as well as will be well tolerated in the body without showing much adverse effects.

Studies have been continued regarding the analgesic property of turmeric but no standard results are being obtained.[2] Furthermore, *Curcuma longa* has shown properties which prevent hepatic toxicity.[3] So, it can also be used with common analgesics like Paracetamol etc, which in high doses are fatal for the liver. *Curcuma longa* Linn., which is widely used as turmeric in cooking Indian foods, is well tolerated in the human body.

Hence the present study is designed for exploring the analgesic activity of *Curcuma longa* Linn. in Wister rats and to compare the analgesic activity of *Curcuma longa* Linn with Aspirin which may widen the therapeutic horizon for the said agent.

METHODS

Study design of the study was preclinical experimental study.

The study was conducted at Research Laboratory and Animal House, Department of Pharmacology, JNMC.

Duration of the study was 6 months (January 2016 to July 2016).

Preparation of the extracts

Ethanolic extract of turmeric prepared in the Central Research Laboratory of JNMC was administered to the animals orally.

Animals required

Healthy, albino rats (150-250gm) twelve weeks old of either sex, bred locally in the animal house of JNMC, Sawangi (Meghe) were used for the study. They were housed under controlled condition of temperature 23±2°C and 12 hour light and dark cycles respectively. The animals are maintained on normal diet and water *ad libitum*. Animals are grouped into 5 of 6 animals each (n= 30).

Rationale for the use of animals

Since these are preliminary studies, the activity of above said drug was confirmed by animal experiments. As the rats were easy to handle, easily available, easy to subject them to testing and their nutrition resembles that of human so, they were preferred for the usage for present study

The animals were allocated randomly into 5 groups of 6 animals each as follows:

- Group I will receive normal saline (NaCl) 0.5 ml - serve as control
- Group II will receive Aspirin 300 mg/kg - serve as Standard
- Group III received ethanolic extract of *Curcuma longa* 100mg/kg orally
- Group IV received ethanolic extract of *Curcuma longa* 200mg/kg orally
- Group V received ethanolic extract of *Curcuma longa* 400mg/kg orally
- Groups III, IV and V served as test groups.

The animals were subjected to the Eddy's hot plate test at different time intervals i.e., 30, 60, 90 and 120 minutes after administration of the drugs and the parameters were noted.

Eddy's hot plate method

Reaction time in seconds was used as the unit for measurement of pain and an increase in reaction time was indicative of analgesia. Time between placing the rat on the hot plate maintained at 55 degrees and jumping or licking of paw were recorded as "reaction time". Cut off time of twenty seconds was imposed in all sets of experiments taken as maximum latency so as to rule out thermal injury while noting down the reaction time. In all the groups, Eddy's hot plate tests were performed prior to drug administration, and at 30, 60, 90 and 120 minutes after drug administration, and the reaction time at each time interval (test latency) were calculated.

Statistical analysis

Statistical analysis was done by using descriptive and inferential statistics using Students' unpaired and paired t-test and software used in the analysis was SPSS 17.0 version and $p<0.05$ is considered as level of significance.

RESULTS

In the present study, we have studied the analgesic effect of *Curcuma longa* where an increase in reaction time in Eddie's hot plate method was considered an important parameter of central analgesic activity by non-selective cox-inhibition.

Table 1 showed the average reaction time (in seconds) of the 5 groups of experimental animals at different interval of time. ANOVA test was applied, which showed that there was difference in the mean reaction time between and within the groups. Then Tukey post hoc test was applied, where we got a significant difference between each of the test groups (III, IV, V) with group I (Control: NaCl), which meant *Curcuma longa* had significant analgesic property at different doses and at various time intervals.

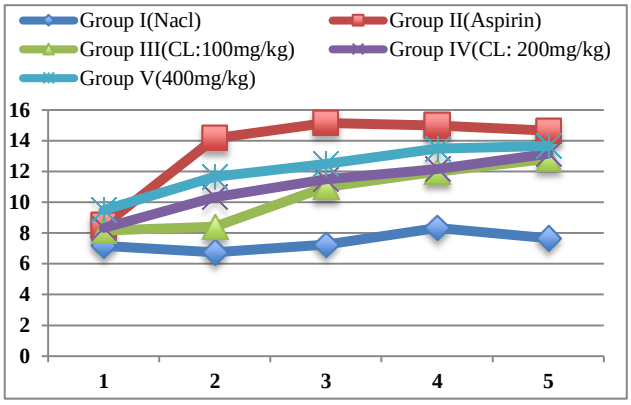

Figure 1: Findings from the hot plate test.

Table 1: The average reaction time (in seconds) in the hot plate method.

Group		0 min	30 min	60min	90 min	120 min
I (Nacl)	Mean	7.2	6.7	7.2	8.3	7.7
	SD	0.3	0.6	0.4	1.0	0.8
II (Aspirin)	Mean	8.5	14.2	15.2	15.0	14.7
	SD	0.5	0.7	0.7	0.6	0.5
III (CL:100mg/kg)	Mean	8.2	8.4	11.0	12.0	12.8
	SD	0.2	0.4	0.9	0.9	0.4
IV (CL:200mg/kg)	Mean	8.3	10.3	11.5	12.2	13.2
	SD	0.5	0.5	0.5	0.7	0.4
V (CL:400mg/kg)	Mean	9.5	11.6	12.5	13.5	13.7
	SD	0.5	0.5	0.5	0.5	0.5
P value		0.0001	0.0001	0.0001	0.0001	0.0001
Significant pairs (Tukey post hoc test)			I and II, I and III, I and IV, I and V	I and II, I and III, I and IV, I and V	I and II, I and III, I and IV	I and II, I and III, I and IV, I and V

Table 2: Comparison of test group with Aspirin (Group II).

Group		Mean diff	Standard error	P value	95% CI
II (30 min)	III	5.7	0.3	0.0001	4.8 - 6.7
	IV	3.8	0.3	0.0001	2.8 - 4.7
	V	2.5	0.3	0.0001	1.5 - 3.5
II (60 min)	III	4.2	0.4	0.0001	3.0 - 5.3
	IV	3.7	0.4	0.0001	2.5 - 4.8
	V	2.7	0.4	0.0001	1.5 - 3.8
II (90 min)	III	2.0	0.4	0.002	0.6 - 3.3
	IV	1.8	0.4	0.004	0.5 -3.2
	V	0.5	0.4	0.808	- 0.8 - 1.8
II (120min)	III	1.8	0.3	0.0001	0.9 - 2.8
	IV	1.5	0.3	0.001	0.6 - 2.4
	V	1.0	0.3	0.530	0.1 - 1.9

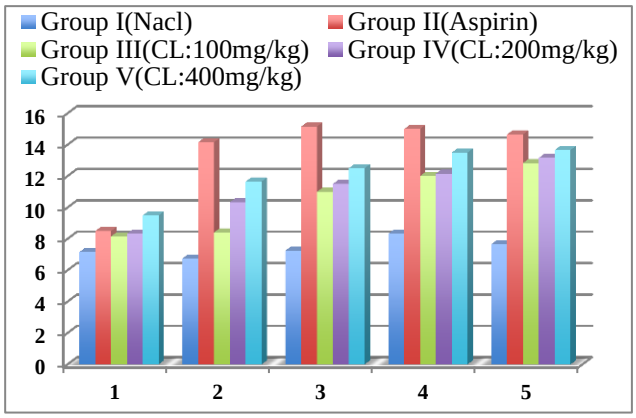

Figure 2: Mean reaction time of each group at different time intervals.

Figure 1 showed the findings from the hot plate test. It revealed increasing mean reaction time, of each test group (group III, IV, V) and the Standard (Aspirin) compared to the control group (NaCl). We got a more vivid picture of the same findings in figure 2, where the five groups were compared together at each time interval.

Table 2 showed the findings on comparing Aspirin (Group II) with the test groups (III, IV, and V), where we did not get any significant difference between Aspirin and *Curcuma longa* at 400 mg/kg (group V) at 90 and 120 minutes respectively. Hence, the analgesic activity of *Curcuma longa* at 400 mg/kg at 90 and 120 minutes was comparable with that of Aspirin.

DISCUSSION

We got significant analgesic activity at 100 and 200mg/kg doses of *Curcuma longa*. These findings were found to be in conjunction with the studies conducted by John S et al and Neha S et al.[11,12] In addition to 100 and 200mg/kg, we got a significant analgesic activity of *Curcuma longa* at 400mg/kg, comparable with Aspirin, which wasn't found in other studies. Another study

conducted in China by Qing Zhu et al demonstrated chronic analgesic effects of *Curcuma longa* in postoperative pain in rat along with acute analgesic activity, which wasn't included in our study.[13]

In our study reaction time was noted for four time intervals only, where the analgesic effect of *Curcuma longa* was found to be rising. Few more readings could have helped in knowing the peak analgesic activity of *Curcuma longa*, which was our only limitation in the study.

CONCLUSION

From our study, we can conclude that *Curcuma longa* Linn. (Turmeric) has significant analgesic activity in rats and its analgesic activity at doses 400mg/kg is comparable to that of aspirin at 90 and 120 minutes of administration respectively.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Jogdand S, Bhattacharjee J. Evaluation of analgesic activity of turmeric (Curcuma longa Linn.) in Wister rats. Int J Basic Clin Pharmacol 2017;6:568-71.