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Evaluation of the analgesic activity of *Capsicum chinense* in experimental animals

Dr. Diptimoyee Devi[1], Dr. Mandeep Sarma Basistha[2*], Dr. Karishma Adhikari[3], Dr. Lakhimi Borah[4]

[1] Associate Professor, Department of Pharmacology, Gauhati Medical College Hospital, Bhangagarh, Guwahati, Assam, India
[2] Post Graduate Trainee, Department of Pharmacology, Medical College Hospital, Bhangagarh, Assam, India
[3] Senior Resident, Department Of Pharmacology, Medical College Hospital, Bhangagarh, Guwahati, Assam, India
[4] Assistant Professor, Department of Pharmacology, Medical College Hospital, Bhangagarh, Assam, India

Abstract
Aims and Objectives: This study was undertaken with the objective of evaluating the analgesic activity of Capsicum *chinense* in experimental animals.
Material and Methods: Ethical review: The present study was performed on mice (20-30 gm body weight) of both sexes.
Plant material: Whole plant of Capsicum *chinense* will be collected and authenticated.
Extraction of plant material: The shade dried and finely powdered fruits were extracted with 99.9% ethanol using Soxhlet apparatus.
Acute toxicity study: Acute toxicity study was carried out according to the OECD 425 Guidelines.
Experimental design: Group 1- Normal Control- Received Normal Saline at a dose of 10ml/kg per orally, Group 2- Disease Control- Acetic Acid 1% (1ml/100gm) i.p., Group 3- Standard- Diclofenac at a dose of 10 mg/kg i.p. + Acetic Acid 1% (1ml/100gm) i.p., Group 4- EECC 200 mg/kg per orally + Acetic Acid 1% (1ml/100gm) i.p., Group 5- EECC 400 mg/kg per orally + Acetic Acid 1% (1ml/100gm) i.p.
Test for peripherally acting analgesic: Acetic acid induced writhing. Diclofenac was used as standard in this test.

Keywords: analgesia, mice, capsicum *chinense*

Introduction
Pain is one of the most common complaint in the present scenario and if chronic, often lead to major health hazard resulting in debilitation, sickness role and adverse drug reactions. Pain management is multidisciplinary [1]. Analgesics are drugs that reduce pain. Most common analgesics used worldwide are the Non-Steroidal Anti Inflammatory Drug (NSAID). However, they often produce significant side-effects, which include gastric ulcer, renal damage, bronchospasm and cardiac abnormalities, thus limiting their use [2]. Drugs of natural origin are an important source for the treatment of many diseases worldwide. The research and analysis of plants employed as analgesic agents in traditional ethnomedicine is one of the productive and logical strategies in the search for new drugs [3].
Capsicum species have been domesticated since the advent of agriculture and have formed part of the human diet since at least 7500 BCE [4]. They are known to be an excellent source of phytochemicals including vitamin A and C, phenolic compounds, flavanoids and carotenoids. Capsaicin and several related compounds called capsaicinoids are produced as secondary metabolites by capsicums [5]. Studies described in the literature suggest that capsicum could modulate analgesia [6]. *Capsicum chinense*, placed among hottest chillis, is an indigenous cultivator growing in Brahmaputra flood plain of Assam, Nagaland, Manipur and other part of Northeast India [7]. It is commonly known as 'bhut jolokia'. It is commonly used as food and spice in both fresh and dried form.
Thus this study was undertaken to evaluate the analgesic activity of *Capsicum chinense* in experimental animals.

Aims and objectives
This study was undertaken with the objective of evaluating the analgesic activity of Capsicum *chinense* in experimental animals.

Material and Methods
Ethical review
The present study was conducted in the Department Of Pharmacology, Gauhati Medical College and Hospital, Guwahati after getting approval from Institutional Animal Ethics Committee.

Experimental Animals
Experiments were performed on mice (20-30 gm body weight) of both sexes. The mice were maintained under standard laboratory conditions of light, temperature and relative humidity. The animals were fed standard diet pellet and drinking water ad libitum. They were acclimatized to laboratory condition for 1 week before the study.

Plant material
Whole plant of Capsicum *chinense* will be collected and authenticated.

Extraction of plant material
The shade dried and finely powdered fruits were extracted with 99.9% ethanol using Soxhlet apparatus.

Drugs and Chemicals
1. Ethanolic extract of fruits of Capsicum *chinense* (EECC)
2. Ethanol
3. Diclofenac
4. Acetic acid 1% solution

Acute toxicity study
Acute toxicity study was carried out according to the OECD 425 Guidelines.

Method
A total of 24 animals were divided into 4 groups containing 6 in each.

Experimental design
Group 1- Normal Control- Received Normal Saline at a dose of 10ml/kg per orally
Group 2- Disease Control- Acetic Acid 1% (1ml/100gm) i.p.
Group 3- Standard- Diclofenac at a dose of 10 mg/kg i.p. + Acetic Acid 1% (1ml/100gm) i.p.
Group 4- EECC 200 mg/kg per orally + Acetic Acid 1% (1ml/100gm) i.p.
Group 5- EECC 400 mg/kg per orally + Acetic Acid 1% (1ml/100gm) i.p.

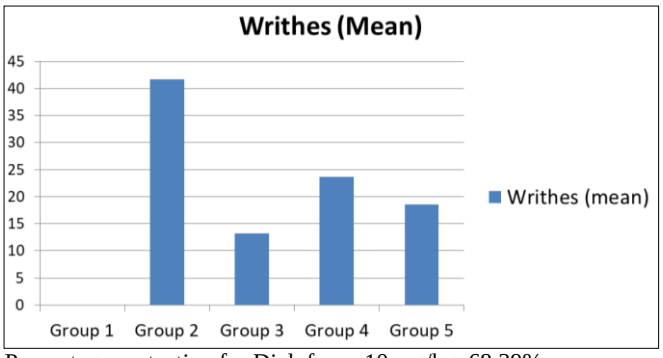
Test for peripherally acting analgesic: Acetic acid induced writhing
Test animals were administered the drug or the standard 30 minutes prior to acetic acid administration. The mice were placed individually into glass beakers and five minutes were allowed to elapse. The mice were then observed for a period of 10 minutes and the number of writhes were recorded for each animal. For scoring purposes, a writhe was indicated by stretching of the abdomen with simultaneous stretching of at least one hind limb.

The formula for computing percent inhibition is
(Average writhes in the control group – Average writhes in the drug group) / (Average writhes in the control group) X 100%
Diclofenac was used as standard in this test.

Results and Observations
Acute Toxicity study
The ethanolic extract of Capsicum *chinense* was found to be safe in the doses used and there was no mortality upto a dose of 2000mg/kg i.p. after 24 hours.

Table 1

Acetic Acid Induced Writhing	
Groups	Writhings (MEAN)
Group 1	0
Group 2	41.67
Group 3	13.17
Group 4	23.67
Group 5	18.5



Percentage protection for Diclofenac 10 mg/kg: 68.39%
Percentage protection for EECC 200 mg/kg: 43.19%
Percentage protection for EECC 400 mg/kg: 55.60%

Fig 1: Acetic acid induced writhing

Discussion
The present study was conducted to assess the anti-nociceptive properties of ethanolic extract of *Capsicum chinense*. The method selected was chemical nociception in the test model of acetic acid-induced writhing. This method was selected to evaluate the peripherally mediated effects of Capsicum *chinense*. To study anti-inflammatory potential, carageenan induced edema method was studied.
The writhing test is a very sensitive method for preliminary evaluation of analgesic activity and the ED_{50} values obtained in animals using this test can be correlated with the analgesic doses in humans, still it cannot indicate whether the effects result from central and/or peripheral actions. The analgesic potential of the extract was shown by acetic acid test to be significant but was not specific. In our study, EECC produced a marked reduction in the number of writhings in the doses of 200mg/kg and 400 mg/kg.
Capsicum species are known to be an excellent source of phytochemicals including vitamin A and C, phenolic compounds, flavanoids and carotenoids. Capsaicinoids are produced as secondary metabolites by capsicums. In present work, these phytoconstituents might be responsible to show analgesic effect. Thus in nutshell, *Capsicum chinense* showed excellent analgesic activity in mice. Further studies on isolation and identification of the active compounds may provide a better source for developing new therapeutic agents.

Conclusion
In the above study, the number of writhings in mice induced by Acetic Acid has been found to be reversed by ethanolic extract of *Capsicum chinense* in a dose dependent manner.

Source of support: Nil
Conflict Of Interest: No

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