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ANTINOCICEPTIVE ACTIVITY EVALUATION OF CORMS OF *COLOCASIA ESCULENTA* VAR *ESCULENTA*

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ABSTRACT

Objective: There are more than 200 cultivars of *Colocasia esculenta* commonly known in English as taro and in Bengali as kochu. The cultivars differ in the pattern of their foliage or in the shape and number of corms (also known as tubers) and cormels, the latter growing from the sides of the main corm. The objective of the present study was to evaluate the antinociceptive potential of methanolic extract of *Colocasia esculenta* var *esculenta* (L.) Schott corm and cormels (MECEE). **Methods:** Extract was administered orally at doses of 50-400 mg/kg. Antinociceptive activity was assessed in intraperitoneally injected acetic acid-induced pain model. **Results:** In acetic acid-induced pain model, the extract reduced the number of abdominal constrictions by 27.0, 40.5, 51.4, and 67.6%, respectively, at doses of 50, 100, 200 and 400 mg/kg. A standard analgesic drug, aspirin (200 and 400 mg/kg) reduced abdominal constrictions by 37.8 and 59.5%, respectively. **Conclusion:** The extract possesses significant antinociceptive potential.

KEYWORDS: *Colocasia esculenta* var *esculenta*, Araceae, antinociceptive, writhing.

1. INTRODUCTION

Colocasia esculenta belongs to the Araceae family. The species has more than 200 cultivars worldwide and is commonly known in English as ‘taro’ and in Bengali as ‘pani kochu’. The cultivars differ in the pattern of their foliage or in the shape and number of corms (also known as tubers) and cormels, the latter growing from the sides of the main corm. *Colocasia esculenta* var *esculenta* (L.) Schott and *Colocasia esculenta* var *antiquorum* are cultivated in Bangladesh, the latter differing from the former by having a small-sized main corm but with

many cormels attached to it. The former has a large-sized corm (weighing more than 1 kg) with five cormels attached, which gives it its Bengali name of 'panchamukhi kochu' or 'five-mouthed kochu' (Fig 1).

Any pharmacological activity studies on 'panchamukhi kochu' are yet to be reported (to our knowledge); however, that of *Colocasia esculenta* or 'pani kochu' have been reported. Antihyperglycemic and antinociceptive potential of leaves of pani kochu has been evaluated.[1] Methanolic extract of corms of pani kochu has also been reported to possess antinociceptive properties.[2] *Colosia esculenta* is also considered to have medicinal properties in Bangladesh. The stems of pani kochu are used by the Garo tribal people residing in Netrakona district, Bangladesh to stop bleeding from external cuts and wounds.[3] Leaf sap is used to treat skin diseases by the Hembrom clan of the Santal tribe in Setabganj of Dinajpur district, Bangladesh.[4]

Pain is the most common symptom of many diseases. The feeling of pain can be caused by irritation of pain receptors, which can be found in many internal and external organs.[5] Pain can also be generated in the central and peripheral nervous system without pain receptors. There can be acute or chronic pain. Pain is usually treated with opioid analgesics, or over the counter drugs like aspirin or paracetamol. Following over-dosage or long-term use, such drugs can cause addiction, gastric ulceration or hepatotoxicity. As such, new drugs without side-effects are necessary. Plants have always proved as excellent sources for discovery of lead compounds and new drugs.[6] For the last few years, we had been conducting screening of antidiabetic and antinociceptive plants of Bangladesh.[7,17] The objective of the present study was to evaluate the antinociceptive potential of methanolic extract of corm and cormels of *Colocasia esculenta* var *esculenta* through acetic acid-induced writhing (abdominal constriction) tests in mice.

2. MATERIALS AND METHODS

Plant material collection

Corms with cormels of *Colocasia esculenta* var *esculenta* (panchamukhi kochu) were collected during August 2016 from a vegetable market in Dhaka city, Bangladesh and taxonomically identified at the Bangladesh National Herbarium (Accession Number 43736).

Figure 1: Corms with cormels of *Colocasia esculenta* var *esculenta* (panchamukhi kochu).

Preparation of methanolic extract of corms and cormels

Corms and cormels were thoroughly cleaned with distilled water and the excess water was soaked off with tissue paper. They were then cut into small pieces, air-dried in the shade and 100g of dried and powdered corms and cormels were extracted with methanol (w:v ratio of 1:5, final weight of the extract, designated as MECEE was 8g).

Chemicals and Drugs

Aspirin was obtained from Square Pharmaceuticals Ltd., Bangladesh. All other chemicals were of analytical grade.

Animals

Swiss albino mice, which weighed between 12-17g were used in the present study. The animals were obtained from International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B). The animals were acclimatized for three days prior to actual experiments. The study was conducted following approval by the Institutional Animal Ethical Committee of University of Development Alternative, Dhaka, Bangladesh.

Antinociceptive activity evaluation through abdominal writhing test

Antinociceptive activity of MECEE was examined as previously described.[18] Mice were divided into seven groups of five mice each. Group 1 served as control and was administered vehicle only. Groups 2 and 3 were orally administered the standard antinociceptive drug aspirin at doses of 200 and 400 mg per kg body weight, respectively. Groups 4-7 were administered MECEE at doses of 50, 100, 200 and 400 mg per kg body weight, respectively.

Following a period of 60 minutes after oral administration of standard drug or MECEE, all mice were intraperitoneally injected with 1% acetic acid at a dose of 10 ml per kg body weight. A period of 5 minutes was given to each animal to ensure bioavailability and onset of chemically induced irritation of acetic acid[16], following which period, the number of abdominal constrictions (writhings) was counted for 10 min. The percent inhibitions of abdominal constrictions were calculated according to the formula given below.

Percent inhibition = $(1 – W_e/W_c) X 100$

Where W_e and W_c represents the number of writhings in aspirin or MECEE administered mice (Groups 2-7) and control mice (Group 1), respectively.

Statistical analysis

Experimental values are expressed as mean ± SEM. Independent Sample t-test was carried out for statistical comparison. Statistical significance was considered to be indicated by a p value < 0.05 in all cases.[19]

3. RESULTS

Antinociceptive activity evaluation results

MECEE caused dose-dependent and significant reductions in the number of abdominal constrictions or writhings induced by intraperitoneal administration of acetic acid. At doses of 50, 100, 200 and 400 mg per kg body weight, MECEE reduced the number of constrictions, respectively, by 27.0, 40.5, 51.4 and 67.6%. A standard antinociceptive drug, aspirin, when administered to experimental animals at doses of 200 and 400 mg per kg body weight, reduced the number of constrictions by 37.8 and 59.5%, respectively. Thus, at the three highest doses of the extract, MECEE showed antinociceptive activity much better than that of 200 mg per kg aspirin. The results are shown in Table 1 and suggest that the extract can be useful in alleviating pain.

Table 1: Antinociceptive effect of MECEE in acetic acid-induced pain model mice.

Treatment	Dose (mg/kg body weight)	Mean number of abdominal constrictions	% inhibition
Control	10 ml	7.4 ± 0.51	-
Aspirin	200 mg	4.6 ± 0.51	37.8*
Aspirin	400 mg	3.0 ± 0.71	59.5*
(MECEE)	50 mg	5.4 ± 0.68	27.0*
(MECEE)	100 mg	4.4 ± 0.68	40.5*
(MECEE)	200 mg	3.6 ± 0.24	51.4*
(MECEE)	400 mg	2.4 ± 0.40	67.6*

All administrations (aspirin and extract) were made orally. Values represented as mean ± SEM, (n=5); *$P < 0.05$; significant compared to control.

4. DISCUSSION

To our knowledge, there have been no reports thus far on the pharmacological activities or phytochemicals present in any part of panchamukhi kochu. Although the bioactive constituent(s) responsible for the antinociceptive property observed with corms and cormels in the present study are yet to be identified, nevertheless the plant can prove to be a good source for phytochemicals that can alleviate pain. Since the plant is both cultivated and also found growing in marshy areas, it can prove to be an affordable source of lead compounds or a new drug that is antinociceptive. It may be noted in this regard that extracts of other Araceae plants have also been shown to alleviate pain,[20,23] and as such, the Araceae family plants merit potential for further scientific studies towards discovery of new pain-killing drugs.

5. CONCLUSION

The present study demonstrates that the methanolic extract of corms and cormels of *Colocasia esculenta* var *esculenta* has antinociceptive potential.

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