

**PRELIMINARY PHYTOCHEMICAL ANALYSIS AND  
ANTINOCICEPTIVE ACTIVITY STUDIES WITH METHANOL  
EXTRACT OF WHOLE PLANTS OF *SENNA OBTUSIFOLIA***

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**ABSTRACT**

**Objective:** The objective of the present study was to phytochemically screen and evaluate the antinociceptive potential of methanolic extract of *Senna obtusifolia* whole plants. **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 20.0, 40.0, 51.4, and 62.9%, 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 40.0 and 65.7%, respectively. **Conclusion:** The extract possesses significant antinociceptive potential.

**KEYWORDS:** *Senna obtusifolia*, Fabaceae, antinociceptive, writhing.

**1. INTRODUCTION**

*Senna obtusifolia* (L.) H.S. Irwin & Barneby is a Fabaceae family plant known in English as Java bean or Sicklepod and in Bengali as Achkigard. The plant is considered to have medicinal value and is used in the traditional medicinal systems of a number of countries. The traditional healers of Lwamondo area, Limpopo province, South Africa administer orally boiled roots of the plant (along with the water) for treatment of swollen penis, stomach problems, or dysmenorrhea.<sup>[1]</sup> In Bangladesh, leaf paste of the plant has been reported to be

used against itches.<sup>[2]</sup> Decoction of whole plant is used to treat male infertility by the Badagry people of Lagos State, Nigeria.<sup>[3]</sup>

For the last few years, we had been conducting screening of antidiabetic and antinociceptive plants of Bangladesh.<sup>[4-14]</sup> The number of diabetic and pre-diabetic patients is increasing in Bangladesh; diabetes is a metabolic disorder, which cannot be totally cured with any known medications. Pain is also extremely common among Bangladesh people and can rise from hard labor as well as some diseases like rheumatism, migraine, and cancer. The major occupation of the rural population of Bangladesh is agriculture, which entails labor under difficult climatic conditions like hot sun or rain and which labor can bring on pain. Household chores can also be tiring and cause pain because of the necessity of doing everything manually. Existing over-the-counter (OTC) drugs against pain like aspirin or paracetamol can give rise to gastric ulceration or hepatotoxicity due to overuse or over-dosage. As such, new medications against pain can be beneficial. The benefits will be greater if such medication(s) are readily available and affordable to the general population. The objective of the present study was to evaluate the antinociceptive potential of methanolic extract of whole plant of *Senna obtusifolia* through acetic acid-induced writhing (abdominal constriction) tests in mice.

## 2. MATERIALS AND METHODS

### *Plant material collection*

Whole plants of *Senna obtusifolia* were collected during December 2016 from Rema Kalenga Wildlife Sanctuary in Habiganj district, Sylhet Division, Bangladesh and taxonomically identified at the Bangladesh National Herbarium (Accession Number 43776).

### *Preparation of methanolic extract of whole plants*

Whole plants 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 68g of dried and powdered plants were extracted with methanol (w:v ratio of 1:5, final weight of the extract, designated as MESO was 4.55g).

### *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 14-18g 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 MESO was examined as previously described.<sup>[15]</sup> 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 MESO 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 MESO, 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<sup>[16]</sup>, 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.

$$\text{Percent inhibition} = (1 - W_e/W_c) \times 100$$

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

### *Statistical analysis*

Experimental values are expressed as mean  $\pm$  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.<sup>[6]</sup>

### *Preliminary phytochemical screening*

Preliminary phytochemical analysis of MESO for presence of saponins, tannins, alkaloids, and flavonoids were conducted as described before.<sup>[17]</sup>

### 3. RESULTS

#### *Antinociceptive activity evaluation results*

MESO caused dose-dependent and significant ( $P < 0.05$ ) 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, MESO reduced the number of constrictions, respectively, by 20.0, 40.0, 51.4 and 62.9%. 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 40.0 and 65.7%, respectively. Thus, at the two highest doses of the extract, MESO 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 possesses significant antinociceptive properties.

**Table 2: Antinociceptive effect of MESO in acetic acid-induced pain model mice.**

Treatment	Dose (mg/kg body weight)	Mean number of abdominal constrictions	% inhibition
Control	10 ml	7.0 ± 0.71	-
Aspirin	200 mg	4.2 ± 0.37	40.0*
Aspirin	400 mg	2.4 ± 0.51	65.7*
(MESO)	50 mg	5.6 ± 0.24	20.0*
(MESO)	100 mg	4.2 ± 0.37	40.0*
(MESO)	200 mg	3.4 ± 0.24	51.4*
(MESO)	400 mg	2.6 ± 0.40	62.9*

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

#### *Preliminary screening of phytochemicals*

Various tests conducted for presence of phytochemicals in MESO indicated the presence of alkaloids and flavonoids.

### 4. DISCUSSION

Since the plant is quite common particularly in the rural areas of Bangladesh, the crude extract can serve as a convenient and possibly affordable source as a raw material to isolate possible new antinociceptive compounds. Preliminary phytochemical screening of MESO indicated the presence of alkaloids and flavonoids, which classes of phytochemicals have previously been implicated in analgesic activities of other plant species.<sup>[18-20]</sup> Thus these groups of compounds may be responsible for the observed antinociceptive effects in the

present study. However, the exact identification of the bioactive component(s) responsible awaits further experiments.

## 5. CONCLUSION

The present study demonstrates that the methanolic extract of whole plants of *Senna obtusifolia* has antinociceptive potential.

## 6. ACKNOWLEDGEMENTS

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