

RESEARCH ON IN-VITRO ANTI-ULCER AND ANTHELMINTIC ACTIVITY BY ETHANOLIC EXTRACT OF *IPOMOEA OBSCURA*

Garamsandh Gandhi V.*, Manivannan R., Gokulnath V., Kanishkar Ram Singh K.,
Nithi Sri E., Uthaya Kumar D.

Excel College of Pharmacy, Komarapalayam, Namakkal District – 637303, Tamil Nadu,
India.

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*Corresponding Author

Garamsandh Gandhi V.

Excel College of Pharmacy,
Komarapalayam, Namakkal District -
637303, Tamil Nadu, India.



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ABSTRACT

Medicinal plants continue to be a rich source of pharmacologically active compounds, and *Ipomoea obscura* (L.) Ker Gawl. (Convolvulaceae), a climbing plant used in traditional medicine, is one such species worth closer study given its reported antioxidant, anti-inflammatory and antimicrobial properties. This study looked at the phytochemical composition of an ethanolic leaf extract of *I. obscura* alongside its in-vitro anti-ulcer and anthelmintic potential. Leaves were collected and authenticated, then shade-dried, powdered, and extracted using cold maceration with ethanol. Phytochemical screening revealed the presence of carbohydrates, proteins and amino acids, alkaloids, flavonoids, phenolics, tannins, terpenoids, glycosides and saponins; steroids were absent. Anti-ulcer activity was gauged using the acid-neutralizing capacity (ANC) method, with an

aluminiumhydroxide–magnesium hydroxide formulation as the reference antacid. The extract yielded ANC values of 116, 64.5, 28.8 and 14.65 mEq/g at concentrations of 100, 200, 500 and 1000 µg/ml, compared to 27.5 mEq/g for the reference at 500 µg/ml. For anthelmintic activity, paralysis and death times were recorded in *Pheretima posthuma*. At 20 mg/ml, the extract induced paralysis in 12.03 minutes and death in 23.20 minutes close to albendazole's 10.54 and 22.37 minutes at the same concentration with effects becoming more pronounced at higher concentrations, while untreated worms stayed alive for up to 7 hours. Taken together, these results point to genuine acid-neutralizing and anthelmintic activity in the

extract, though they represent early-stage in-vitro findings rather than proof of clinical benefit. Confirming any therapeutic relevance will require more rigorous mechanistic, toxicological and in-vivo work.

KEYWORDS: *Ipomoea obscura*; ethanolic leaf extract; acid-neutralizing capacity; anti-ulcer activity; anthelmintic activity; *Pheretima posthuma*; phytochemical screening.

1. INTRODUCTION

Herbal medicines preparations made from plants or plant parts — often contain a wide mix of primary and secondary metabolites. Their long-standing role in traditional healthcare has driven a great deal of pharmacognostic, phytochemical and pharmacological research aimed at tracking down reproducible sources of bioactive compounds. That said, it's worth being clear that "natural" doesn't automatically mean "safe." Factors like plant identity, how and when it was collected, the extraction solvent used, dosage, contamination, adulteration, and interactions with conventional drugs can all shape both how well a plant works and how risky it might be. For this reason, any proper evaluation of a medicinal plant needs a clearly defined botanical source, a transparent extraction process, and biological assays that are actually well-controlled.

Gastrointestinal ulceration itself is not a simple, single-cause condition it arises from an imbalance between aggressive factors like gastric acid and pepsin on one side, and protective mechanisms such as mucus, bicarbonate, epithelial repair and mucosal blood flow on the other. Since antacids work mainly by neutralizing acid in the gut lumen, measuring acid-neutralizing capacity offers a reasonably useful early in-vitro screen for buffering potential. It's important to note, though, that this kind of screen doesn't capture the full complexity of ulcer biology, and it can't tell us anything about cytoprotection, anti-secretory effects, or actual healing in a living system at best, it gives an initial point of comparison.

Helminth infections, meanwhile, remain a significant concern in both human and veterinary health. Anthelmintic drugs tend to work by disrupting the parasite's neuromuscular function, energy metabolism, or structural integrity. *Pheretima posthuma* has long served as a convenient screening model for this kind of activity, since its neuromuscular responses give researchers an easy, observable endpoint paralysis and death in a simple in-vitro setup. Useful as it is for initial screening, though, this model can't stand in for parasite-specific efficacy testing, pharmacokinetics, safety data, or actual clinical evaluation.

Ipomoea obscura (L.) Ker Gawl. belongs to the family Convolvulaceae and is found throughout tropical and subtropical regions. It's a slender, twining plant with cordate or ovate leaves and funnel-shaped flowers. Traditionally, it's been used to treat digestive disorders, ulcers, wounds, inflammation and parasitic infections. Earlier studies have documented various phytochemical constituents in the plant along with antioxidant, anti-inflammatory, antimicrobial, cytotoxic and other related activities. Compounds like flavonoids, phenolics, tannins, glycosides, terpenoids and saponins are particularly interesting here, since these classes are known to contribute to antioxidant activity, interact with cell membranes, and modulate inflammatory or enzymatic processes.

With that background in mind, this study set out to link the phytochemical profile of an ethanolic leaf extract to two straightforward in-vitro screens acid neutralization as a marker of anti-ulcer potential, and paralysis/death in *P. posthuma* as a marker of anthelmintic potential

2. AIM AND OBJECTIVES

The aim was to investigate the phytochemical constituents and preliminary in-vitro anti-ulcer and anthelmintic activities of the ethanolic leaf extract of *Ipomoea obscura*.

The objectives were to collect and authenticate the leaves; prepare an ethanolic extract by cold maceration; perform qualitative phytochemical screening; determine acid-neutralizing capacity at selected concentrations using an aluminium hydroxide–magnesium hydroxide reference formulation; and evaluate anthelmintic activity against *Pheretima posthuma* using albendazole as the standard.

3. MATERIALS AND METHODS

3.1 Plant material and authentication

Leaves of *Ipomoea obscura* were collected from the Siddha Medical Plants Garden and Research Centre, Mettur Dam, Tamil Nadu, India. The collected material was separated, washed with distilled water to remove adhering debris and shade-dried for approximately 20–25 days. The dried leaves were reduced to a coarse powder. The source dissertation records botanical authentication by Dr. P. Radha, Research Officer (Botany), with authentication identifier 1150726088O.



3.2 Preparation of ethanolic extract

The powdered leaves were extracted by cold maceration. The plant material was soaked in ethanol at room temperature with intermittent agitation. After extraction, the liquid was separated from the marc by filtration, and the filtrate was concentrated to obtain the crude ethanolic extract. Cold maceration was selected as a simple method that can minimize thermal exposure of potentially thermolabile constituents. The dissertation does not provide a complete extractive yield, solvent-to-drug ratio or detailed concentration and drying record; these parameters should be reported in future repeat studies for reproducibility.

3.3 Preliminary phytochemical screening

Qualitative tests based on standard pharmacognostic procedures were used to screen for alkaloids, glycosides, phenolics, flavonoids, carbohydrates, proteins and amino acids, tannins, terpenoids, steroids and saponins. A positive result was recorded when the characteristic colour change, precipitate or foam reaction was observed. The intensity notation used in the source was retained: “+” denotes detected and “++” denotes relatively prominent detection under the qualitative test conditions; these symbols are not quantitative concentration measurements.

3.4 In-vitro anti-ulcer screening by acid-neutralizing capacity

The acid-neutralizing capacity of the ethanolic extract was assessed at 100, 200, 500 and 1000 µg/ml. Aluminium hydroxide plus magnesium hydroxide (AHMH-500) served as the reference antacid. The test preparations were diluted with water, and a measured aliquot was made up to a final volume of 70 ml. Thirty millilitres of 1 N hydrochloric acid were added, and the mixture was stirred for 15 min. After addition of phenolphthalein, the remaining acid was titrated with 0.5 N sodium hydroxide until the appearance of a pink endpoint. The amount of acid consumed was used to calculate ANC per gram of antacid according to the source protocol.

3.5 In-vitro anthelmintic assay

Adult *Pheretima posthuma* earthworms approximately 3–5 cm in length were collected from moist soil, washed with normal saline and divided into groups. The source dissertation describes six worms per group and 0.5% carboxymethyl cellulose (CMC) as the control vehicle. The ethanolic extract was tested at 5, 10 and 20 mg/ml, while albendazole at 20 mg/ml served as the standard. Paralysis was recorded when no movement was observed except after vigorous shaking. Death was recorded after the worm failed to move on vigorous shaking and after loss of body colour, as described in the source protocol. An editorial carry-over error in the dissertation refers once to *Acalypha indica*; because all study tables, figures and the stated research objective concern *I. obscura*, the present article consistently reports the test extract as *Ipomoea obscura*.

3.6 Data presentation

The source data are presented descriptively because the dissertation does not report replicate-level observations, dispersion measures or inferential statistics. Accordingly, the present article reports the recorded values without adding unsupported claims of statistical significance.

4. RESULTS

4.1 Phytochemical profile

The ethanolic leaf extract gave positive qualitative reactions for carbohydrates, proteins and amino acids, alkaloids, flavonoids, phenolics, tannins, terpenoids, glycosides and saponins. Steroids were not detected under the reported test conditions. Flavonoids and phenolics were recorded as “++”, while the other detected groups were recorded as “+”. These findings indicate a chemically heterogeneous extract and provide a plausible basis for investigating multiple biological activities, although qualitative screening cannot identify individual compounds or establish their concentrations.

Phytochemical group	Ethanolic extract result
Carbohydrates	+
Proteins and amino acids	+
Alkaloids	+
Steroids	—
Flavonoids	++
Phenolics	++
Tannins	+
Terpenoids	+

Glycosides	+
Saponins	+

4.2 Acid-neutralizing capacity

The extract showed the highest reported ANC per gram at 100 µg/ml, followed by progressively lower values at increasing nominal concentrations. At 500 µg/ml, the extract produced an ANC of 28.8 mEq/g antacid, which was close to and slightly higher than the reference AHMH-500 value of 27.5 mEq/g. The source interprets this as comparatively meaningful acid neutralization at 500 µg/ml. The numerical pattern should be interpreted carefully because ANC per gram can be affected by the way the test preparation is normalized; the results do not demonstrate gastric mucosal protection or therapeutic anti-ulcer efficacy.

Preparation	Concentration	NaOH consumed (ml)	Acid consumed (mEq)	ANC per gram of antacid
<i>I. obscura</i> extract	100 µg/ml	36.8	11.6	116.0
<i>I. obscura</i> extract	200 µg/ml	34.2	12.9	64.5
<i>I. obscura</i> extract	500 µg/ml	31.2	14.4	28.8
<i>I. obscura</i> extract	1000 µg/ml	30.7	14.65	14.65
AHMH-500 standard	500 µg/ml	32.5	13.75	27.5

4.3 Anthelmintic activity

The extract exhibited a concentration-associated reduction in the time required for paralysis and death. At 5 mg/ml, paralysis and death occurred at 63.53 and 78.25 min, respectively. At 10 mg/ml, the times decreased to 17.15 and 46.02 min. At 20 mg/ml, the extract produced paralysis at 12.03 min and death at 23.20 min. Albendazole at 20 mg/ml produced paralysis at 10.54 min and death at 22.37 min. The 20 mg/ml extract therefore approached the observed performance of the standard in this assay, whereas control worms remained alive for up to 7h.

Group	Treatment	Concentration	Paralysis time (min)	Death time (min)
I	0.5% CMC control	–	Not observed during 7 h	Not observed during 7 h
II	Albendazole	20 mg/ml	10.54	22.37
III	EEIO	5 mg/ml	63.53	78.25
IV	EEIO	10 mg/ml	17.15	46.02
V	EEIO	20 mg/ml	12.03	23.20

5. DISCUSSION

The phytochemical screening points to several metabolite classes commonly linked to bioactivity in medicinal plants. Phenolics and flavonoids likely contribute antioxidant and anti-inflammatory effects, tannins can bind proteins and interact with membranes, and saponins and alkaloids may affect membrane permeability or neuromuscular function. It's worth stressing that these are plausible mechanisms, not conclusions the data here are qualitative, and no compound was isolated, quantified, or tested against a specific target.

On the ANC results, the extract clearly neutralized acid under the conditions tested, and the value at 500 µg/ml came reasonably close to the AHMH reference a promising early sign. That said, the higher ANC-per-gram seen at the lowest concentration, along with the overall downward trend as concentration increased, suggests the normalization and dilution approach needs closer scrutiny. Future work should include replicates, calibration controls, pH–time profiles, and a fully documented calculation method. It's also worth remembering that anti-ulcer activity isn't just about neutralizing acid mucus preservation, antioxidant defense, reduced acid secretion, control of inflammatory mediators, and mucosal repair all play a role too.

The anthelmintic data show a fairly clear split between the low and high extract concentrations. At 20 mg/ml, the extract came close to albendazole's paralysis and death times, while 5 mg/ml lagged well behind. That concentration-dependent pattern is encouraging and consistent with a real pharmacological effect, but it's still just screening-level evidence. Earthworm assays are sensitive to worm size, condition, temperature, the vehicle used, exposure volume, how endpoints are judged, and how many replicates are run and the source dissertation doesn't report means with standard deviations, individual worm data, or any statistical testing. Going forward, the study would benefit from randomized allocation, blinded assessment, larger sample sizes, properly validated concentrations, and a clear statistical plan.

These findings line up with earlier work cited in the dissertation on *I. obscura*'s phytochemistry and pharmacology antioxidant, anti-inflammatory, antimicrobial, cytotoxic, immunomodulatory, and anthelmintic effects have all been reported before. What this study adds is a preliminary side-by-side look at acid neutralization and earthworm paralysis/death using the same ethanolic leaf extract. Even so, it's best understood as an initial screening study, not proof that this extract works as a treatment in humans.

6. LIMITATIONS AND FUTURE DIRECTIONS

The study is limited by its qualitative phytochemical design, incomplete extraction parameters, lack of extractive yield, absence of replicate-level data and statistical analysis, and reliance on two in-vitro screens. Botanical voucher documentation, chromatographic fingerprinting, total phenolic and flavonoid quantification, and compound-level identification would improve reproducibility. Anti-ulcer research should progress to validated gastric ulcer models with appropriate ethical approval, while anthelmintic research should incorporate parasite-specific assays and mechanism-oriented endpoints. Acute and repeated-dose toxicity, genotoxicity, drug–herb interaction and formulation studies are also needed before any translational claim can be made.

7. CONCLUSION

The ethanolic leaf extract of *Ipomoea obscura* tested positive for several phytochemical groups, including flavonoids, phenolics, tannins, terpenoids, glycosides, and saponins. In the acid-neutralizing capacity assay, the extract's performance at 500 µg/ml came close to that of the aluminium hydroxide magnesium hydroxide reference. In the *Pheretima posthuma* assay, paralysis and death times shortened in a concentration-dependent manner, with the 20 mg/ml preparation approaching the activity seen with albendazole at the same concentration.

Together, these findings mark *Ipomoea obscura* as a promising candidate for further pharmacognostic and pharmacological study though they fall well short of establishing clinical efficacy or safety. Before the extract could be considered for development into a therapeutic product, it would need standardized extraction methods, quantitative chemical characterization, properly powered statistical studies, in-vivo efficacy testing, and thorough toxicological evaluation.

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