

Effect of “Cuti Cuti” Extract (*Blechnum Asplenioides*) on Intestinal Motility in Albino Mice

Xiomara C. Benavente Chalco^{1,2}, Elena Hidalgo Agurto³, Thalia Suarez Hernandez¹, Luis Lens-Sardon⁴, Juan Huaccho-Rojas^{1*}

Xiomara C. Benavente Chalco^{1,2},
Elena Hidalgo Agurto³, Thalia
Suarez Hernandez¹, Luis Lens-
Sardon⁴, Juan Huaccho-Rojas^{1*}

¹CHANGE Research Working Group, Carrera de Medicina Humana, Facultad de Ciencias de la Salud, Universidad Científica del Sur, Lima, Peru

²Sociedad Científica Médico Estudiantil Peruana, Lima, Perú.

³Facultad de Medicina Humana, Universidad de San Martín de Porres; Centro de Investigación de Medicina Tradicional y Farmacología, Lima, Perú.

⁴Universidad de San Martín de Porres, Facultad de Medicina Humana; Centro de Investigación de Medicina Tradicional y Farmacología. Lima, Perú

Correspondence

J. Huaccho Rojas

CHANGE Research Working Group, Carrera de Medicina Humana, Facultad de Ciencias de la Salud, Universidad Científica del Sur, Lima, Peru.

E-mail: jhuaccho@cientifica.edu.pe

History

- Submission Date: 27-02-2026;
- Review completed: 30-03-2026;
- Accepted Date: 06-04-2026.

DOI : 10.5530/pj.2026.18.124

Article Available online

<http://www.phcogj.com/v18/i2>

Copyright

© 2026 Phcogj.Com. This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International license.



ABSTRACT

Introduction: Intestinal motility is regulated by the enteric nervous system, which responds to contractile changes. Constipation is one of its main disorders. Although prokinetic drugs are effective, they are associated with adverse effects. Therefore, the use of medicinal plants represents an innovative therapeutic alternative. **Methods:** An experimental study was conducted in 40 male albino *Mus musculus* mice. Two doses (250 and 500 mg/kg) of hydroalcoholic extract of *Blechnum asplenioides* were administered, as well as metoclopramide (10 mg/kg) and loperamide (5 mg/kg), distributed into five study groups. Gastric motility was assessed by measuring the distance traveled by activated charcoal 30 minutes after administration of the test substances. **Results:** ANOVA test revealed significant differences ($P < 0.05$; 95% CI). The extract of *Blechnum* showed a prokinetic effect on gastric motility, with the 250 mg/kg dose counteracting the inhibitory action of loperamide. **Discussion:** The findings indicate that *Blechnum asplenioides* extract improves intestinal motility at evaluated doses, possibly due to compounds such as flavonoids and tannins. The significant difference between the 250 mg/kg dose and loperamide suggests antagonism to its inhibitory effect. However, no additional benefit was observed at higher doses, highlighting the importance of further studies to clarify mechanisms, safety, and clinical relevance. Extrapolation to humans should be made cautiously since animal models do not always replicate human physiology. **Conclusion:** The extract of *Blechnum asplenioides* demonstrates a prokinetic effect in albino mice, likely mediated by bioactive compounds and antioxidant properties. Further research is needed to confirm its mechanism, safety, and potential therapeutic application in humans.

Keywords: *Blechnum*; intestinal motility; loperamide; metoclopramide; medicinal plants

INTRODUCTION

Intestinal motility is regulated by the enteric nervous system, which coordinates motor, transport, secretion, sensory perception, storage, and excretion functions in the gastrointestinal tract. This motility is the result of changes in the electrical and contractile properties of smooth muscle cells, controlled by various chemical neurotransmitters¹. In addition to its role in digestion, gastric motility influences nutrient absorption by facilitating the breakdown of carbohydrates, proteins, fats, vitamins, and minerals, which are essential for energy production, growth, and cell maintenance².

Constipation is one of the main alterations of intestinal motility and affects between 2% and 27% of the world's population, including Latin America, with a higher prevalence in children, women of reproductive age, and older adults³. Currently, pharmacological management is based on the use of prokinetics and laxatives; however, these can cause adverse effects such as toxicity, dependence, and cardiovascular complications when used for prolonged periods, in addition to representing a high cost to the population⁴⁻⁶.

In this context, traditional medicine based on medicinal plants emerges as an accessible alternative with a lower risk of adverse effects. These plants have been used since ancient times for therapeutic purposes to prevent, alleviate, or treat various conditions⁷. Many of them have been reported to have digestive properties, acting

on the gastrointestinal mucosa and stimulating its motility and secretions, which aids digestion and the elimination of gas⁸⁻¹⁰.

Various studies have identified the presence of phenolic compounds, alkaloids, flavonoids, tannins, sterols, glycosides, saponins, and terpenoids in these plants, which are attributed with prokinetic and laxative effects¹¹⁻¹³. In particular, tannins have been shown to increase the secretion of water and ions in the intestine, a mechanism similar to that of sodium picosulfate, a diphenolic laxative¹⁴. Likewise, the antioxidant effect of certain bioactive metabolites allows the neutralization of reactive oxygen species (ROS), which have been associated with chronic constipation^{13,15,16}.

A study conducted in Malaysia isolated proanthocyanidins in plants of the genus *Blechnum* and demonstrated their antioxidant activity using the DPPH (2,2-diphenyl-1-picrylhydrazyl) assay, evidencing their free radical scavenging capacity¹⁷. Similarly, research in murine models with loperamide-induced constipation has reported an accumulation of ROS, suggesting that plants with antioxidant properties could influence intestinal motility.

The genus *Blechnum*, comprising approximately 236 species of ferns, is widely used in traditional medicine in countries such as Chile, India, and China. Its extracts are used in the form of infusions or pastes to treat lung conditions, infections, urinary diseases, inflammation, and digestive disorders¹⁸⁻²⁰.

Cite this article: Xiomara C B C, Elena H A, Thalia C S H, Luis L S, Juan H R. Effect of “Cuti Cuti” Extract (*Blechnum Asplenioides*) on Intestinal Motility in Albino Mice. Pharmacogn J. 2026;18 (2): 113-119.

Phytochemical studies have identified compounds such as alcohols, aldehydes, carotenoids, phenolic acids, sesquiterpenes, fatty acids, phytosterols, steroids, lignans, flavonoids, and anthocyanidins, which have antioxidant, antimicrobial, anticarcinogenic, healing, antiulcer, and anti-inflammatory properties²¹⁻²⁴.

Despite the traditional use of various species of the genus *Blechnum*, their effect on intestinal motility has not been extensively researched. However, the presence of bioactive compounds suggests their potential as a prokinetic agent. In this context, the objective of the present study is to determine the effect of *Blechnum asplenioides* extracts on intestinal motility in male *Mus musculus* albino mice.

MATERIALS AND METHODS

Study design

The design of this study is preclinical and experimental. Preclinical because it involves the use of animals to carry out the research and experimental due to direct intervention in the experimental animals.

Population

Animal sample:

The animal population consisted of 40 male albino *Mus musculus* mice weighing between 25g and 30g. These mice were randomly acquired from the National Institute of Health and were assigned to five experimental groups, each consisting of eight male albino mice. APPENDIX 1

Inclusion criteria:

- Males obtained from the National Institute of Health.
- Age range of 1 month and body weight of 25-30 grams.
- Raised in accordance with international research standards.

Sampling

Simple random sampling was performed using Microsoft Excel version 2024. First, each mouse was weighed and screened, and assigned a specific color. Subsequently, sampling was performed among the 40 mice for assignment to the 5 experimental groups detailed below.

Plant sample: The plant sample consisted of a set of leaves from the species *Blechnum asplenioides*, which were collected by the researchers. The leaves were obtained from the department of Cajamarca, province of San Ignacio (latitude and longitude: 5°07'22.8"S, 79°02'52.8"W). The taxonomy of the plant was verified at the Natural History Museum of the National University of San Marcos, after which the preparation of the hydroalcoholic extract of *Blechnum asplenioides* was initiated. APPENDIX 2

Preparation of the plant sample and hydroalcoholic extract

Fresh samples of *Blechnum asplenioides* were subjected to two washing processes. First, the material was washed with drinking water and then disinfected with 0.05% sodium hypochlorite. A second washing with distilled water was performed to remove any hypochlorite residue. The plant material was then air-dried at room temperature for one week in a place protected from direct sunlight. After drying, the material was ground using a mortar and stored in labeled glass jars.

The hydroalcoholic extract was prepared from the dried plant material. A total of 200 g of powdered *Blechnum asplenioides* was placed in a 2000 mL Erlenmeyer flask, and 1500 mL of 70% ethanol was added. The mixture was kept under continuous agitation on a magnetic stirrer for 24 hours. It was then filtered and concentrated in a water bath at 60 °C until a volume of 250 mL was obtained; this process was repeated to obtain a final volume of 500 mL²⁴.

All procedures were performed by trained personnel, including the bioterium technician, veterinarian, principal investigator, and co-investigators, at the Center for Research in Traditional Medicine and Pharmacology of the Faculty of Medicine of the University of San Martín de Porres.

Preparation of the animal sample: Over a period of 14 days, the 48 *Mus musculus* albino mice underwent an acclimatization process in which they were kept under controlled conditions, including a temperature between 22 and 26 °C, noise levels below 70 dB, humidity between 60 and 75%, and a 12/12 hour light/dark cycle. In addition, they were provided with free access to water and a balanced diet. The animals were handled by trained personnel, such as doctors and students participating in the research, who received the necessary training in advance.

Evaluation of gastrointestinal motility: The Arbos method was used to carry out the evaluation. The rodents were subjected to a 24-hour fasting period prior to the experiment, during which they had free access to water to maintain adequate hydration²⁵.

Administration of *Blechnum Asplenioides* hydroalcoholic extract: The administration of *Blechnum Asplenioides* hydroalcoholic extract, the preparation of which was detailed previously, was carried out using an orogastric tube. The doses designated for experimental groups IV and V were 250 mg/kg and 500 mg/kg of body weight, respectively, equivalent to an approximate volume of 0.25 mL. In order to maintain blindness to the solution being administered, a blind administration procedure was implemented so that the researchers would not be aware of the nature of the substance^{10,22}. The extract was administered by trained personnel, including the doctors and students involved in this research.

Administration of activated charcoal: Thirty minutes after administration of the substances, all mice received 10% activated charcoal orally at a dose of 0.25 mL per 10 grams of body weight. Thirty minutes after administration of activated charcoal, the animals were sacrificed by cervical dislocation. A laparotomy-type dissection was then performed to remove the small intestine, using the pyloric portion and ileocecal valve as anatomical landmarks.

Measurement of the total length of the intestine traversed by the carbon marker after administration of the hydroalcoholic extract of *Blechnum asplenioides*

The individual times at which the hydroalcoholic extract of *Blechnum asplenioides* was administered to each specimen were recorded in order to evaluate the status 30 minutes after administration in the experimental group²⁵. Measurements were taken of the length of the small intestine and the path of the activated carbon, ensuring that the latter contained at least 1 cm of carbon in a continuous sequence. These values were obtained using a ruler and were expressed in centimeters. The measurements were taken under a blind evaluation process, without knowledge of the identity of the groups. The personnel responsible for the measurements will be trained individuals, including the technician and veterinarian from the animal facility, the principal investigator, and the co-investigators, all of whom have been previously trained to perform this task.

According to the following scheme:

- Group I (blank): Mice with 5% activated charcoal without treatment.
- Group II (Positive control): Mice treated with metoclopramide 10mg/kg and 5% activated charcoal²⁶.
- Group III (Negative control): Mice treated with 5 mg/kg loperamide and 5% activated charcoal²⁶.
- Group IV (Problem sample): Mice treated with *Blechnum Asplenioides* 250 mg/kg and 5% activated charcoal²⁷.

- Group V (Problem sample): Mice treated with *Blechnum Asplenioides* 500mg/kg and 5% activated charcoal²⁷.

Questionnaires: A data collection form was used to record general information, such as the code or number assigned to each mouse after tagging, the weight of each specimen, the time of treatment administration, and the treatment under evaluation.

In addition, the parameters of the variables studied were recorded. For intestinal motility, the total length of the intestine traversed by the carbon marker after the intervention was noted. Lethality was also recorded on the forms. A form specifically designed by the researchers will be used as a data collection tool. APPENDIX 3.

Statistical analysis: Results were reported as means +/- standard deviation for quantitative variables. Microsoft Office Excel 2024 and the statistical program GraphPad Prism Version 9.05.0 were used as computer support, while to validate, a two-tailed ANOVA test was applied along with Tukey's comparison test, assigning significant differences for a p-value <0.05.

Sample size: To ensure statistically significant representativeness in the study, the minimum number of animals necessary was used, considering theoretical and ethical aspects by performing a normality test.

To determine the sample size required for the pilot study, the resource formula developed by Mead was applied²⁸:

$$x = \frac{N}{\frac{A}{100}}$$

Where:

- N=7 (corresponds to the minimum number of experimental units required, based on previous research and following the guidelines of the Animal Ethics Committee).
- A=90% (the estimated incidence rate is considered to be 10%).
- When performing the calculation, X= 7/(90/100)= 7.77 is obtained, which is rounded up to 8 animals.

Consequently, 8 *Mus musculus* albino mice were assigned to each of the 5 experimental groups, totaling 40 mice for the entire experiment (8 per group)^{10,31}.

Ethical considerations

The use of mice in the laboratory was essential to the success of our research. The recommended guidelines for the handling of experimental animals were followed, as specified in the manual on the care and procedures for laboratory animals. During the course of

the experiment, the mice were euthanized by cervical dislocation. This procedure was performed by personnel duly trained in the handling of laboratory animals, including the bioterium technician and veterinarian, as well as the research team, who had previous experience from various preclinical studies conducted previously^{26,27}.

For euthanasia, the cervical dislocation method was used in order to minimize suffering and cause as little harm as possible to the animals. This procedure was performed without prior sedation, placing the animal in a prone position on a surface where it could be held, such as a rough surface or the cage grid. Pressure was applied to the cervical region with the index finger or forceps, while a sharp pull was applied to the tail or hind limbs to separate the cervical vertebrae from the skull. The separation of the vertebrae was verified to confirm the death of the animals²⁶⁻²⁸.

To ensure ethical integrity in our activities, we strictly followed the recommendations for the handling and care of animals used in experimentation, such as quarantine, adequate and controlled feeding, water supply, cage management, as well as cleaning and disinfection procedures, in accordance with the manual Guide to the Management and Care of Laboratory Animals: Mice, produced by the National Institute of Health.²⁹⁻³¹ In addition, we complied with the requirements established by the Institutional Committee on Ethics in Animal and Biodiversity Research (CIEI-AB-CIENTÍFICA) APPENDIX 4.

RESULTS

The phytochemical evaluation is shown in Table 1. The descriptive analysis of the five experimental groups showed differences in intestinal motility (Table 2) (Figure 1). The group treated with 250 mg/kg extract had the highest intestinal motility (75.28 ± 10.05; 95% CI: 66.87–83.68), followed by the 500 mg/kg extract group (65.14 ± 26.58;

95% CI: 42.92–87.36), the Metoclopramide group (50.85 ± 33.03; 95% CI: 23.24–78.46),

the Charcoal group (40.38 ± 31.37; 95% CI: 14.15 - 66.60), and finally the Loperamide group, which recorded the lowest intestinal motility (26.33 ± 30.15; 95% CI: 1.12 - 51.53).

The normality test showed that all distributions met the assumptions of normality according to Kolmogorov-Smirnov and Shapiro-Wilk, except for the Loperamide group, which did not pass the Shapiro-Wilk test (p = 0.0377) (Table 3).

Analysis of variance (ANOVA) showed statistically significant differences between groups (F = 3.981, p = 0.0091, R² = 0.3127) (Table 4). Subsequently, Tukey's multiple comparison test indicated that only the comparison between Loperamide and Extract 250 reached statistical significance (p = 0.048, mean difference: -48.95, q = 5.028) (Table 5). No significant differences were found between the other groups.

Table 1. Phytochemical evaluation of *Blechnum Asplenioides* Sw "cuti cuti"

Assay	Reagent	Result
Alkaloids	Dragendorff	++
	Mayer	++
	Hager	++
	Wagner	++
Flavonoids	Shinoda reaction	+
	Lead acetate	+++
Phenolic compounds	Ferric chloride	+++
Anthocyanins	—	-
Triterpenes and steroids	Lieberman-Buchard	++
Free amino acids	Ninhydrin	-
Saponins	Foam test	+
	Rosenthaler	+

Table 2. Descriptive statistical analysis of the study groups

Group	N	Mean± SD	95% CI (Lower limit - Upper limit) Upper)
Metoclopramide	8	50.85 ± 33.03	23.24 - 78.46
Control	8	40.38 ± 31.37	14.15 - 66.60
Loperamide	8	26.33 ± 30.15	1.12 - 51.53
Extract 250	8	75.28 ± 10.05	66.87 - 83.68
Extract 500	8	65.14 ± 26.58	42.92 - 87.36

Table 3. Normality test of variables by group

Group	KS distance	p-value (KS)	W (Shapiro-Wilk)	p-value (SW)
Metoclopramide	0.1843	>0.10	0.9462	0.6731
Control	0.2086	>0.10	0.8436	0.082
Loperamide	0.2834	0.0578	0.8113	0.0377
Extract 250	0.2139	>0.10	0.894	0.255
Extract 500	0.2042	>0.10	0.9353	0.5659

Table 4. Analysis of variance (ANOVA) between groups

Source of variation	SS (Sum of squares)	df (Degrees of)	MS (Mean square)	F	p-value	R ²
Betwe en groups	12070	4	3018	3.981	0.0091	0.3127
Within groups	26,540	35	758.3			
Total	38,610	39				

Table 5. Multiple comparisons using Tukey's test

Comparison	Difference in means	q	p-value
Metoclopramide vs Control	10.48	1.076	No
Metoclopramide vs Loperamide	24.53	2.519	No
Metoclopramide vs Extract 250	-24.43	2,509	No
Metoclopramide vs Extract 500	-14.29	1,468	No
Control vs Loperamide	14.05	1,443	No
Control vs Extract 250	-34.90	3,585	No
Control vs Extract 500	-24.76	2,543	No
Loperamide vs Extract 250	-48.95	5.028	0.048
Loperamide vs Extract 500	-38.81	3,987	No
Extract 250 vs Extract 500	10.14	1,041	No

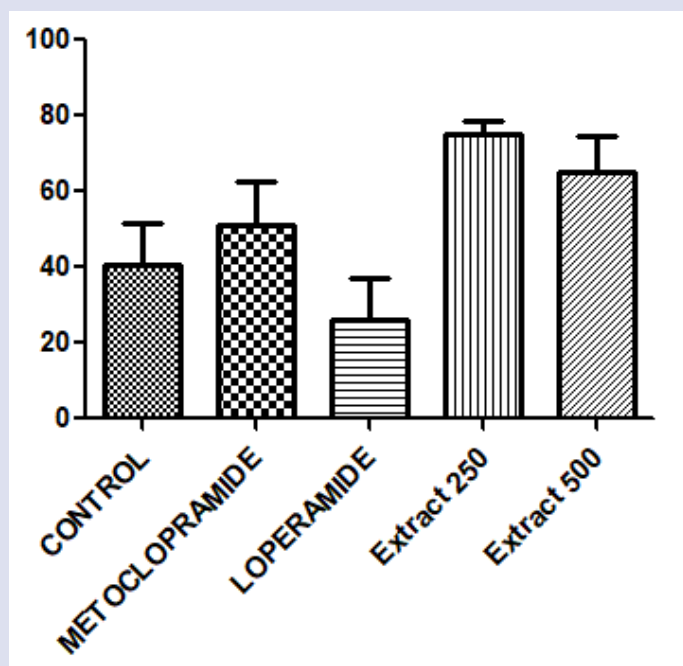


Figure 1. Percentage of travel of intestinal *Blechnum asplenioides*

DISCUSSION

The aim of this study was to evaluate the effect of *Blechnum asplenioides* hydroalcoholic extract on intestinal motility in albino mice, finding an increase in intestinal transit with a dose of 250 mg/kg compared to the group treated with loperamide. This finding suggests a possible prokinetic action of the extract, capable of counteracting the inhibitory effect of loperamide on intestinal motility^{25,27}. This effect is consistent with what has been reported for other medicinal plants with prokinetic activity, such as *Senna alexandrina*, *Zingiber officinale* (ginger), and *Aloe vera*, whose extracts increase intestinal motility through stimulation of smooth muscle contraction, modulation of enteric neurotransmission, and enhancement of intestinal secretion³². In this context, *B. asplenioides* appears to exhibit a comparable pharmacological profile, supporting its potential role as a plant-derived prokinetic agent.

The findings suggest that *B. asplenioides* exerts a prokinetic effect, with a tendency to improve intestinal motility. This effect could be explained by the presence of bioactive compounds such as flavonoids, tannins, and alkaloids^{27,12}. Flavonoids have been extensively studied for their ability to modulate intestinal smooth muscle contractility by inhibiting phosphodiesterases, which increases cyclic AMP levels and promotes peristalsis³⁰. Complementarily, tannins stimulate the secretion of water and ions in the intestinal mucosa, a mechanism similar to that of sodium picosulfate, a diphenolic laxative used clinically³¹. These pharmacodynamic mechanisms resemble those described for other flavonoid-rich plant-based prokinetic agents, including *Zingiber officinale* and *Aloe vera*, where these compounds modulate smooth muscle contractility and intestinal secretion, thereby reinforcing the biological plausibility of the observed effect of *B. asplenioides*^{32,33}.

Multiple comparisons analysis using Tukey's test showed a significant difference only between the groups treated with loperamide and *B. asplenioides* at a dose of 250 mg/kg ($p = 0.048$). This finding confirms that the extract, at this dose, exerts a prokinetic effect opposite to the inhibitory action of loperamide on intestinal motility. However, no significant differences were found between the 500 mg/kg dose and the other treatments. This pattern suggests a non-linear dose-response relationship, in which moderate doses enhance motility, whereas higher doses fail to produce additional benefit. Such behavior has been described in several phytopharmacological models, where excessive concentrations of plant metabolites activate counter-regulatory or inhibitory pathways^{33,34}.

This result suggests that increasing the dose does not necessarily enhance the effect and that there may be a physiological threshold in the response, possibly associated with self-regulation phenomena of the enteric nervous system or with the saturation of receptors involved in motility^{26,27}. At higher concentrations, receptor saturation or desensitization may occur due to competitive or non-competitive interactions between bioactive phytochemicals and receptors of the enteric nervous system. Under these conditions, multiple compounds may compete for the same binding sites (competitive interaction) or interfere with receptor signaling through allosteric mechanisms (non-competitive interaction), resulting in a plateau or even attenuation of the prokinetic response despite increasing doses³⁵.

The absence of statistical significance at the 500 mg/kg dose may therefore reflect a paradoxical or inhibitory effect at high concentrations, mild subclinical toxicity, or interference with neurotransmitter-mediated signaling in the enteric nervous system, ultimately leading to a reduction in intestinal motility rather than further stimulation^{35,36}. This phenomenon has also been reported with other herbal extracts exhibiting biphasic or hormetic dose-response curves³⁶.

The antioxidant capacity of the metabolites present in *B. asplenioides* could also play a relevant role in its prokinetic activity. Oxidative stress has been linked to enteric system dysfunction and the onset of intestinal dysmotility^{15,16}. In this context, the neutralization of reactive oxygen species by antioxidant compounds of the *Blechnum* genus, such as proanthocyanidins and flavonoids, could restore redox homeostasis and improve intestinal contractile function^{17,19,22}. This hypothesis is consistent with reports linking the antioxidant activity of plant metabolites with improved intestinal transit^{13,15,16}.

On the other hand, the absence of significant differences in some post hoc comparisons again suggests that the prokinetic effect of the extract could reach a physiological limit, at which no further increase is observed with higher doses. This phenomenon has been described in other models and could be explained by self-regulatory mechanisms of the enteric nervous system or by the saturation of motility-related receptors²⁶. In contrast, loperamide, used as a negative control, showed a marked reduction in intestinal transit, consistent with its mechanism of action as a peripheral opioid agonist in the gastrointestinal tract, which decreases cholinergic activity and prolongs transit time²⁴.

Overall, the results support the potential of *Blechnum asplenioides* as a prokinetic agent. However, it will be necessary to further characterize its active metabolites and elucidate its specific mechanism of action, as well as to advance the evaluation of its safety and possible applications in the treatment of intestinal motility disorders¹³.

The main limitations of this study lie in its preclinical nature, as results obtained in animal models cannot always be extrapolated to humans due to physiological and metabolic differences. Furthermore, although the experimental design allows variables to be controlled and causal relationships to be established, it does not evaluate long-term effects or interactions with other factors present in real clinical conditions. Likewise, the lack of specific analyses of the underlying molecular mechanisms limits a detailed understanding of the observed effect, so future studies should include pharmacokinetic, pharmacodynamic, and safety evaluations to determine its potential therapeutic application.

CONCLUSION

The findings of this study suggest that *Blechnum asplenioides* extract has a prokinetic effect, evidenced by increased intestinal motility in the treated groups. Although significant differences were observed between the groups, post hoc analysis did not confirm specific differences between the treatments evaluated. These results support the potential of the extract as a natural alternative for the management of intestinal motility disorders; however, further studies are needed to clarify its mechanisms of action, evaluate its long-term safety, and determine its viability as a therapeutic option in humans.

ACKNOWLEDGEMENTS

The authors would like to express their sincere gratitude to the Universidad Científica del Sur and the Universidad de San Martín de Porres for providing access to their laboratories and animal facilities, which made this research possible. We also acknowledge their valuable support in promoting and strengthening the study of traditional and complementary medicine.

REFERENCES

1. Camilleri M. Gastrointestinal motility disorders in neurologic disease. *J Clin Invest* 2021;131. <https://doi.org/10.1172/jci143771>.
2. Basile EJ, Launico MV, Sheer AJ. Physiology, Nutrient Absorption. StatPearls Publishing; 2023.
3. Iade B, Umpierre V. Management of patients with constipation. *Arch Med Intern* 2012;34:67–79.

4. Laxatives containing phenolphthalein and their relationship to cancer development [cited 2024 January 25]. Available at: https://www.uv.mx/rm/num_anteriores/revmedica_vol15_num2/articulos/laxantes.pdf
5. The FDA warns of serious heart problems with high doses of the anti-diarrhea drug loperamide (Imodium), including due to excessive consumption excessive and improper U.S Food and Drug Administration. FDA; 2023 [cited 2024 January 25]. Available at: <https://www.fda.gov/drugs/drug-safety-and-availability/la-fda-advierte-de-problemas-cardiacos-graves-con-dosis-altas-del-medicamento-antidiarreico>
6. Thiruvengadam M, Shariati MA, Akram M, Zainab R, Daniyal M, Bankole MM, et al. Herbal medicine for the management of laxative activity. *Curr Pharm Biotechnol* [Internet]. 2022 [cited 2024 Feb 4];23(10):1269–83. Available at: <https://pubmed.ncbi.nlm.nih.gov/34387161/>
7. Baskaran X-R, Geo Vigila A-V, Zhang S-Z, Feng S-X, Liao W-B. *J Zhejiang Univ Sci B* [Internet]. 2018 [cited 2024 Jan 25];19(2):85–119. Available at: <https://pubmed.ncbi.nlm.nih.gov/29405039/>
8. Gallegos Zurita M. Medicinal plants: the main alternative for healthcare in the rural population of Babahoyo, Ecuador. *An Fac Med (Lima Peru :1990)* [Internet]. 2016 [cited 2024 January 25];77(4):327. Available
9. Sher J, Jan G, Israr M, Irfan M, Yousuf N, Ullah F, et al. Biological characterization of *Polystichum lonchitis* L. for phytochemical and pharmacological activities in Swiss albino mice model. *Plants* [Internet]. 2023 [cited 2024 Feb 6];12(7):1455. Available at: <http://dx.doi.org/10.3390/plants12071455>
10. Olagorta M, Regil B, Lázaro ML, Díez M. Digestive disorders: phytotherapeutic treatment. *Farm Prof (Internet)* [Internet]. 2017 [cited 2024 Jan 30];31(3):30–6. Available at: <https://www.elsevier.es/es-revista-farmacia-profesional-3-articulo-afecciones-digestivas-tratamiento-fitoterapico-X0213932417612245>
11. Nazir S, Khan H, Khan SA, Alam W, Ghaffar R, Khan SHA, et al. In vivo acute toxicity, laxative and antiulcer effect of the extract of *Dryopteris Ramose*. *Cell Mol Biol (Noisy-le-grand)* [Internet]. 2021 [cited 2024 Jan 25];67(1):9–16. Available at: <https://pubmed.ncbi.nlm.nih.gov/34817374/>
12. Effect of *Jatropha curcas* L. seed alkaloid extract on intestinal motility [cited 2024 Jan 25]. Available at: <https://www.medigraphic.com/pdfs/revcubplamed/cpm-2013/cpm131j.pdf>
13. Muhammad N, Rehman N ur, Khan H, Saeed M, Gilani A-H. Prokinetic and laxative effects of the crude methanolic extract of *Viola betonicifolia* whole plant in rodents. *BMC Complement Altern Med* [Internet]. 2013 [cited 2024 Jan 25];13(1):70. Available from: <http://dx.doi.org/10.1186/1472-6882-13-70>
14. F la S de A y. EH. Sodium picosulfate Page 1/3 [Internet]. *Aeped.es*. [cited 2024 Jan 25]. Available at: <https://www.aeped.es/peidiamecum/generatpdf/api?n=84010>
15. Wintola OA, Sunmonu TO, Afolayan AJ. The effect of *Aloe ferox* Mill. in the treatment of loperamide-induced constipation in Wistar rats. *BMC Gastroenterol* [Internet]. 2010;10(1). Available at: <http://dx.doi.org/10.1186/1471-230x-10-95>
16. Vermorken A, Andrés E, Cui Y. Letter: chronic constipation – a warning sign for oxidative stress? *Aliment Pharmacol Ther* [Internet]. 2015;42(3):385–6. Available from: <http://dx.doi.org/10.1111/apt.13257>
17. Lai H-Y, Lim Y-Y, Kim K-H. Isolation and characterization of a proanthocyanidin with antioxidative, antibacterial, and anti-cancer properties from fern *Blechnum orientale*. *Pharmacognosy Magazine* [Internet]. 2017 [cited 2024 Jan 26];13(49):31. Available from: <http://dx.doi.org/10.4103/0973-1296.197659>
18. Gasper AL, Almeida TE, Dittrich VA de O, Smith AR, Salino A. Molecular phylogeny of the fern family *Blechnaceae* (Polypodiales) with a revised genus-level treatment. *Cladistics* [Internet]. 2017;33(4):429–46. Available at: <http://dx.doi.org/10.1111/cla.12173>
19. Waswa EN, Muema FW, Odago WO, Mutinda ES, Nanjala C, Mkala EM, et al. Traditional uses, phytochemistry, and pharmacological properties of the genus *Blechnum*—A narrative review. *Pharmaceutics (Basel)* [Internet]. 2022 [cited 2024 Jan 25];15(7):905. Available from: <http://dx.doi.org/10.3390/ph15070905>
20. Kumar DG, Syafiq AM, Ruhaiyem Y, Shahnaz M. *Blechnum orientale* Linn.: An Important Edible Medicinal Fern [Internet]. *Impactfactor.org*. [cited February 25, 2024 Feb 4]. Available at: <https://impactfactor.org/PDF/IJPPR/7/IJPPR,Vol7,Issue4,Article17.pdf>
21. Andrade JM de M, Maurmann N, Pranke P, Turatti ICC, Lopes NP, Henriques AT. Identification of compounds from non-polar fractions of *Blechnum spp* and a multitarget approach involving enzymatic modulation and oxidative stress. *J Pharm Pharmacol* [Internet]. 2016 [cited 2024 Jan 25];69(1):89–98. Available at: <https://academic.oup.com/jpp/article/69/1/89/6127752?login=false>
22. Torres-Benítez A, Ortega-Valencia JE, Flores-González M, Sánchez M, Simirgiotis MJ, Gómez-Serranillos MP. Phytochemical characterization and in vitro and in silico biological studies from ferns of genus *Blechnum* (*blechnaceae*, *polypodiales*). *Antioxidants (Basel)* [Internet]. 2023 [cited 2024 Jan 25];12(3):540. Available from: <https://www.mdpi.com/2076-3921/12/3/540>
23. Lai HY, Lim YY, Kim KH. *Blechnum Orientale Linn* - a fern with potential as antioxidant, anticancer and antibacterial agent. *BMC Complement Altern Med* [Internet]. 2010 [cited 2024 Feb 6];10(1):15. Available from: <http://dx.doi.org/10.1186/1472-6882-10-15>
24. Nonato FR, Barros TAA, Lucchese AM, Oliveira CEC, Santos RR dos, Soares MBP, et al. Antiinflammatory and antinociceptive activities of *Blechnum occidentale* L. extract. *J Ethnopharmacol* [Internet]. 2009 [cited 2024 Feb 6];125(1):102–7. Available from: <https://pubmed.ncbi.nlm.nih.gov/19524656/>
25. Meléndez-Espíritu S, Huaccho-Rojas J, Santos-Cajahuanca F, Abanto-Cabeza C, Jáuregui-Farfán J, Mendoza-Toribio J et al. Drug interactions of *Maytenus macrocarpa* or “chuchuhuasi” leaves with drugs that inhibit and stimulate intestinal motility. *Acta méd. peruana* [Internet]. 2013 Oct [cited 2024 Feb 21]; 30(4): 114–119. Available at: http://www.scielo.org.pe/scielo.php?script=sci_arttext&pid=S1728-59172013000400011&lng=es.
26. Arbos, J.; Cegrí, A.; Lopez-Soriano, FR.J.; Argiles, J.M. A simple method for determining the rate of gastrointestinal transit in the rat. *Arch. Intern. Physiol. Bioch. Biophys.* 1993; 101:113-115.
27. Suarez, T, Solano, G. Pharmacological interaction between the hydroalcoholic extract of *Blechnum asplenioides* "cuti cuti" and metformin in hyperglycemic albino rats. *Repository of the Scientific University of the South.* 2023
28. Harkness JE, Turner PV, VandeWoude S, Wheler CL. *Harkness and Wagner's Biology and Medicine of Rabbits and Rodents.* John Wiley & Sons; 2010.
29. Neves SMP, University of São Paulo. Faculty of Pharmaceutical Sciences, Mancini Filho J, Menezes EW de, University of São Paulo. Faculty of Pharmaceutical Sciences, University of São Paulo. Faculty of Pharmaceutical Sciences, editors. *Manual of care and procedures with laboratory animals from the FCF-IQ/USP production and experimentation animal facility.* University of São Paulo. Faculty of Pharmaceutical Sciences; 2016.
30. Márquez AH, Motta N, González-Mujica F. Effects of plant extracts on intestinal glucose absorption and its uptake by apical membrane vesicles of enterocytes. *RFM* [Internet]. Jan. 2002 [cited 2025 Feb 20];25(1):107-110.
31. Barth S, Bulferi G, Lanza R, De Togni H, Raso F. The combination of probiotics, plant extracts, and micronutrients shows positive effects on intestinal barrier integrity. *Evid Self Med* [Internet]. 2024;4. Available at: <http://dx.doi.org/10.52778/efsm.24.0034>

32. Huang X., Lu H.-L., & Xu W.-X. (2020). Role of platelet-derived growth factor receptor α positive cells in purinergic inhibitory nerve-smooth muscle transmission. *Sheng li xue bao [Acta physiologica Sinica]*, 72(3), 391–398.
33. Chomentowski, A., Drygalski, K., Kleszczewski, T., Berczyńska, M., Tylicka, M., Kapala, J., Raciborska, A., Zubrzycki, P., Hady, H. R., & Modzelewska, B. (2025). Polyphenols as modulators of gastrointestinal motility: Mechanistic insights from multi-model studies. *Pharmaceuticals (Basel, Switzerland)*, 18(10), 1564. <https://doi.org/10.3390/ph18101564>
34. Nigusse, T., Zhang, L., Wang, R., Wang, X.-N., Li, J., & Liu, C. (2019). Flavonoids in a crude extract of *Catha edulis* inhibit rat intestinal contraction via blocking Ca^{2+} channels. *Neurogastroenterology and Motility: The Official Journal of the European Gastrointestinal Motility Society*, 31(7), e13602. <https://doi.org/10.1111/nmo.13602>
35. Chda, A., & Bencheikh, R. (2023). Flavonoids as G protein-coupled receptors ligands: New potential therapeutic natural drugs. *Current Drug Targets*, 24(17), 1346–1363. <https://doi.org/10.2174/0113894501268871231127105219>
36. Jodynis-Liebert, J., & Kujawska, M. (2020). Biphasic dose-response induced by phytochemicals: Experimental evidence. *Journal of Clinical Medicine*, 9(3), 718. <https://doi.org/10.3390/jcm9030718>

Cite this article: Xiomara C B C, Elena H A, Thalia C S H, Luis L S, Juan H R. Effect of "Cuti Cuti" Extract (*Blechnum Asplenioides*) on Intestinal Motility in Albino Mice. *Pharmacogn J.* 2026;18 (2): 113-119.