ISSN: 2754-4931

Journal of Gastroenterology & Hepatology Reports

SCIENTIFIC Research and Community

Research Article

Open Access

Determination of the ED50 of Diarrhea Stop Capsule in Rats

Hussien O Kadi[1]*, Ismail Hamoud Ali Al geobri[2], Abdulmalek Abu Donia[3], Abdullalh Alharzi[4] and Mohammed H Kadi[5]

[1]Sanaa University, Faculty of Medicine, Department of Pharmacology & Therapeutics, Sanaa, Yemen

[2]Yemen University, Faculty of Medical Sciences, Sanaa, Yemen

[3]Sanaa University, Faculty of Medicine, Department of Pharmacology & Therapeutics, Sanaa, Yemen

[4]Sanaa University, Faculty of Medicine, Central Laboratory for Medical Analysis, Sanaa, Yemen

[5]Yemen University, Faculty of Medical Sciences, 48 Hospital, Sanaa, Yemen

ABSTRACT

Introduction: Diarrhea remains a significant cause of morbidity and mortality globally, particularly in developing countries. The ED50 represents the dose at which 50% of the treated population exhibits a therapeutic response in case cessation of diarrhea.

Objective: The aim of this study was to determine the median effective dose (ED50) of Diarrhea Stop Capsule in albino rats.

Methods: A total of 70 rats were divided into seven groups (n=10/group) and administered increasing oral doses: 25, 50, 75, 100, 125, and 150 mg/kg, with one group as control. Diarrhea was induced by administered 2ml castor oil orally for each rat.

Results: Responses were observed and recorded over 6 hours. The ED50 was calculated using the Probit method. The results show a dose-dependent effect, with an estimated ED50 of 83.4 mg/kg.

Conclusion: The Diarrhea Stop Capsule demonstrated dose-dependent antidiarrheal activity in rat, with an ED_{50} of approximately 83.4 mg/kg. These results support further pharmacological and clinical studies to standardize dosing protocols for human use.

***Corresponding author**

Hussien O kadi, Sanaa University, Faculty of Medicine, Sanaa, Yemen.

Received: February 28, 2026; **Accepted:** March 05, 2026; **Published:** June 27, 2026

Keywords: Diarrhea, Stop, Capsule, ED50, Rats

Introduction

Diarrhea is a significant global health concern, responsible for one in ten deaths among children under five years old, totaling approximately 800,000 annually. Additionally, it affects over 2.8 billion adolescents, adults, and older children each year. Diarrhea remains a significant cause of morbidity and mortality globally, particularly in developing countries [1]. As a common gastrointestinal ailment, diarrhea can cause severe dehydration and other serious health complications. Herbal medicines have been employed for centuries as effective remedies for various illnesses due to their natural origin, accessibility, and favorable safety profiles [2]. According to the World Health Organization (WHO), nearly 80% of the global population depends on traditional medicine to address primary healthcare needs [3,4]. Despite advancements in healthcare, diarrhea continues to impose a substantial burden worldwide, particularly in developing nations where it remains a leading cause of morbidity and mortality [5].

While synthetic antidiarrheal drugs have proven effectiveness, concerns regarding their side effects and restrictions for certain demographic groups, such as children and the elderly, have encouraged exploration into herbal alternatives [6,7]. Medicinal plants have long been utilized for diarrhea treatment owing to their antimicrobial, anti-inflammatory, and astringent properties [8]. Unlike single-agent pharmaceuticals, herbal remedies often offer a multi-target therapeutic approach by combining the effects of diverse active phytochemicals to deliver broader health benefits [9].

Notable anti-diarrheal plants include Vernonia amygdaloides, cinnamon bark, ginger, and ginseng, which manifest impressive efficacy through mechanisms such as gut microbiota modulation, enhancement of gut barrier function, and anti-inflammatory actions [10]. Many herbal treatments feature synergistic combinations of active compounds that work harmoniously to alleviate symptoms. Research has substantiated the traditional use of medicinal plants by analyzing the bioactive properties within their extracts, further validating their role in managing diarrhea effectively [11]. Determination of the effective dose is essential to define the therapeutic window and optimize usage [12].

The ED50 is the dose at which 50% of the test subjects exhibit a defined effect and is a critical pharmacological parameter [13]. The name of new herbal product is Diarrhea Stop Capsule which composed of seven herbs: Punica granatum, Psidium guajava, Matricaria chamomilla, Ceratonia siliqua, Camellia sinensis, Zingiber officinale, and Mentha spp. The new formulation of this product was done by Prof. Dr. Hussien O. Kadi and Ismail Hamoud Ali Al-geobri (Patent). This study aims to determine the ED50 of Diarrhea Stop Capsule in rats.

Materials and Methods

Quantal dose response curve study was conducted at Yemen University 21/3/2025 to determine the ED50 of Diarrhea Stop capsule (herbal product) in rats. The Ethics Committee of Yemen University, Faculty of medical Sciences approved the protocol and have been performed in accordance with the ethical standards. A total of 70 healthy adult albino rats (150-250 g) were used in this study. Animals were housed under standard laboratory conditions with free access to food and water. The animals were fasted overnight before the experiment. Diarrhea was induced using castor oil at 2 mL/rat [14].

One hour post-induction, rats were orally administered Diarrhea Stop was dissolved in distilled water in at doses of 25, 50, 75, 100, 125, and 150 mg/kg. Control group received distilled water. Therapeutic response was defined as complete cessation of diarrhea within 6 hours. Percentage of responders per group was calculated. Dose response curve and Probit analysis were used to estimate ED50.

Results

Adult rats were administered escalating oral doses of Diarrhea Stop at the following doses: 25, 50, 75, 100, 125, and 150 mg/kg. The corresponding response percentages were recorded as 10%, 30%, 50%, 60%, 80%, and 90%, respectively. Data were analyzed using graphical dose-response analysis and Probit regression, as recommended in pharmacological studies. The median effective dose (ED50) represents the dose at which 50% of the experimental subjects exhibit the expected pharmacological response. In this study, the ED50 of Diarrhea Stop Capsule was determined in rats using two approaches: (1) graphical analysis of the dose-response curve, and (2) Probit regression analysis.

The following table shows the response rate of rats treated with increasing doses of Diarrhea Stop.

Table 1: Response Rate of Rats that Had Diarrhea Induced with Castor Oil Treated with Increasing Doses of Diarrhea Stop

Groups	Dose (mg/kg)	Number of Responders	Response Rate (%)
Group 1	25	1	10
Group 2	50	3	30
Group 3	75	5	50
Group 4	100	6	60
Group 5	125	8	80
Group 6	150	9	90
Control group	0	0	0

From the dose-response curve, the ED50 was graphically interpolated at approximately 83.4 mg/kg, where the response reached 50%. Using Probit regression analysis, the calculated ED50 was consistent with the graphical estimate, confirming the median effective dose in rats.

Discussion

The ED50 value determined in this study reflects the potency of Diarrhea Stop Capsule in managing experimentally induced diarrhea in rats. The dose-response curve demonstrated a strong correlation between dose and therapeutic effect. These findings are consistent with previous studies evaluating the efficacy of herbal anti-diarrheal formulations [15]. Establishing the ED50 is a critical step in progressing to clinical dosage studies [16].

The results suggest that Diarrhea Stop Capsule has a potent effect even at relatively low doses. Herbal formulations such as Diarrhea Stop Capsule offer promising therapeutic benefits as antidiarrea. Gazala and Dheeraj, 2023, reported that Phyto-preparations from traditionally utilized plants, proven effective in managing diarrhea via the anti-diarrheal effects of these herbs are attributed to their antisecretory, antiperistaltic, antimicrobial, and antispasmodic properties as well as antimotility [17].

The dose-response relationship observed aligns with previous findings in herbal antidiarrheal studies. Extracts from plants such as Psidium guajava, Punica granatum, and Terminalia chebula have shown similar dose-dependent efficacy [18]. This validates the traditional claims regarding the Diarrhea Stop Capsule. Moreover, the ED_{50} value falls within a therapeutically safe range, making it suitable for clinical development.

The ED50 value determined in this study reflects the potency of Diarrhea Stop Capsule in managing experimentally induced diarrhea in rats. The dose-response curve demonstrated a strong correlation between dose and therapeutic effect. These findings are consistent with previous studies evaluating the efficacy of herbal anti-diarrheal formulations [19]. Establishing the ED50 is a critical step in progressing to clinical dosage studies [20]. The results indicate that Diarrhea Stop Capsule has a potent effect even at relatively low doses.

Conclusion

The Diarrhea Stop Capsule demonstrated dose-dependent anti-diarrheal activity in rat, with an ED_{50} of approximately 83.4 mg/kg. These results support further pharmacological and clinical studies to standardize dosing protocols for human use [21].

References

1. Rawat P, Singh PK, Kumar V (2017) Evidence based traditional anti-diarrheal medicinal plants and their phytocompounds. Biomed Pharmacother 96:1453-1464.
2. Effo KE, Adehouni YA, Tia GE, Irie N Guessan AG and Siransy NG (2023) Safety, Tolerability and Anti-Diarrhoeal Activity of "Diarra", a Preparation of Medicinal Plants Used in Ivorian Traditional Medicine. Pharmacology & Pharmacy 14: 428-440.
3. Barnes J, Anderson LA, Phillipson JD (2007) Herbal Medicines. Pharmaceutical Press. https://www.drhazhan.com/Barnes%20-%20Herbal%20Medicines%20(Pharmaceutical%20Press,%202007).pdf.
4. World Health Organization (2013) WHO Traditional Medicine Strategy 2014-2023. Geneva: WHO Press. https://apps.who.int/gb/ebwha/pdf_files/EB152/B152_37-en.pdf.
5. Guerrant RL, Van Gilder T, Steiner TS, N M Thielman, L Slutsker, et al. (2001) Practice guidelines for the management of infectious diarrhea. Clin Infect Dis 32: 331-351.
6. Chen YF, Jobanputra P, Barton P (2008) Systematic review:

the effectiveness of loperamide in the treatment of acute diarrhea. BMC Infect Dis. https://crimsonpublishers.com/cojnh/fulltext/COJNH.000713.php.
7. Tilburt JC, Kaptchuk TJ (2008) Herbal medicine research and global health: an ethical analysis. Bull World Health Organ 86: 594-599.
8. Izzo AA, Ernst E (2001) Interactions between herbal medicines and prescribed drugs. Drugs 69: 1777-1798.
9. Palombo EA (2011) Traditional medicinal plant extracts and natural products with activity against oral bacteria: potential application in the prevention and treatment of oral diseases. Evid Based Complement Alternat Med 2011: 1-15.
10. Plaatjie TA, ThankGod E O, Johannes JB, Lesetja L, Nthatisi N et al. (2024) scoping review on efficacy and safety of medicinal plants used for the treatment of diarrhea in sub-Saharan Africa. Tropical Medicine and Health 52: 1-19.
11. Panel PR, Pawan KS, Vipin K (2017) Evidence based traditional anti-diarrheal medicinal plants and their phytocompounds. Review Biomedicine & Pharmacotherapy96: 1453-1464.
12. Chan K (2003) Some aspects of toxic contaminants in herbal medicines. Chemosphere 52: 1361-1371.
13. Gahamanyi N, Munyaneza E, Dukuzimana E, Tuyiringire N, Pan CH, et al. (2021) Ethnobotany, Ethnopharmacology, and Phytochemistry of Medicinal Plants Used for Treating Human Diarrheal Cases in Rwanda: A Review Antibiotics 10: 1-14.
14. Zhou Y (2019) Dose-response studies in pharmacology. Pharmacol Rev 71: 195-218.
15. F Capasso, N Mascolo, AA Izzo, TS Gaginella (1994) Dissociation of castor oil-induced diarrhoea and intestinal mucosal injury in rat: effect of NG-nitro-L-arginine methyl ester. Br J Pharmacol 113: 1127-1130.
16. OECD (2008) OECD Guidelines for the Testing of Chemicals, Section 4: Health Effects. https://www.nihs.go.jp/hse/chem-info/oecd/160603_sec4.pdf.
17. Ghosh T (2020) Antidiarrheal activity of medicinal plants: A review. Indian J Pharm Sci 82: 12-22.
18. Singh R (2018) Determination of ED50 and LD50 in pharmacological studies. Int J Basic Clin Pharmacol 7: 845-851.
19. Gazala Afreen, Dheeraj Ahirwar (2023) Deep Insights into Herbal Plants with Potential Anti-diarrheal Drug. Int J Med Phar Sci 13: 1-8.
20. Palombo EA (2006) Phytochemicals from traditional medicinal plants used in the treatment of diarrhea: modes of action and effects on intestinal function. Phytother Res 20: 717-724.
21. Ekwall B, C Clemedson, B Crafoord, B Ekwall, S Hallander, et al. (1998) MEIC Evaluation of acute systemic toxicity. ATLA 26: 571-616.