International Journal of Pharmaceutical and Bio-Medical Science

ISSN(print): 2767-827X, ISSN(online): 2767-830X

Volume 05 Issue 03 March 2025

Page No : 160-162

DOI: https://doi.org/10.47191/ijpbms/v5-i3-02, Impact Factor: 8.163

Anti-Gastric Ulcer Activity of Red Cabbage Ethanol Extract (*Brassica Oleracea* Var. Capitata L.)

Windy Putri Kumala[1], Erwin[1], Hadi Kuncoro[2], Abdul Aziz[1], Usman[3], Ritson Purba[1], Muh. Amir Masruhim[3]

[1]Department of Chemistry, Faculty of Mathematics and Natural Sciences, University of Mulawarman, Samarinda (East Kalimantan) 75119, Indonesia

[2]Faculty of Pharmacy, University of Mulawarman, Samarinda (East Kalimantan) 75119, Indonesia

[3]Study Program of Chemical Education, Faculty of Teacher Trainer and Education, University of Mulawarman, Samarinda (East Kalimantan) 75119, Indonesia

ABSTRACT

Gastric ulcer is a disease characterized by damage to the gastric mucosal lining. Gastric ulcers can be caused by the use of non-steroidal anti-inflammatory drugs, Helicobacter pylori bacterial infection, smoking, and stress. The use of drugs tends to have negative effects on the body and safer alternative drugs from natural ingredients are needed. Therefore, this study aims to determine the anti-gastric ulcer activity of red cabbage (*Brassica oleracea* var. Capitata L.) ethanol extract on the stomach of mice induced by aspirin and determine the best dose that provides protection. This research method includes sample preparation, extraction by maceration. Furthermore, the flavonoid test uses a qualitative staining test method. While the anti-gastric ulcer test uses a laboratory experimental method with a Posttest Only Control Group Design designs. A total of 25 male mice were divided into 5 groups with 5 mice in each group including cabbage extract at a dose of 21 mg/Kg BW of mice, cabbage extract at a dose of 42 mg/Kg BW of mice, cabbage extract at a dose of 84 mg/Kg BW of mice, a comparison of cimetidine 0.52 mg/Kg BW of mice, and the control was only given distilled water. The results of the study showed that red cabbage extract contains flavonoid compounds and can reduce the average number and severity of gastric ulcers in mice with an optimum dose of 84 mg/kg BW.

KEYWORDS: gastric ulcer, flavonoids, natural ingredients, mice, red cabbage, *Brassica oleracea* var. Capitata L.

ARTICLE DETAILS

Published On:
07 March 2025

Available on:
https://ijpbms.com/

I. INTRODUCTION

The stomach is an organ in the human digestive system that is shaped like a pouch and functions as a container and digester of food, drinks, and medicines. The stomach must be well maintained so that food digestion is not disturbed. Things that can damage the stomach are food, alcoholic drinks, smoking, stress, and nonsteroidal anti-inflammatory drugs. These things can cause wounds in the mucous membrane, or what is often called an ulcer. Gastric ulcers are one of the diseases that cause death which ranks 10th. In Indonesia, every 100 thousand deaths there are 8.41 people caused by gastric ulcer disease or around 0.9% of deaths. In Indonesia, Peptic Ulcer Disease (PUD) is found in people between the ages of 20-50 years [1,2]. Nonsteroidal anti-inflammatory drugs (NSAIDs) such as aspirin, are the most widely used group of drugs as anti-inflammatory and pain medications. However, the side effects that can occur, namely ulcers and gastrointestinal bleeding, will be a problem that must be overcome in the use of this type of drug [3].

One of the stomach diseases that occurs due to digestive disorders that are often experienced by humans is gastric ulcers. This disease can occur in the esophageal mucosa, stomach or small intestine [4]. Flavonoids have shown very effective and promising preventive and therapeutic potential in peptic ulcers [5,6].

Garlic and cabbage extracts can reduce the length of gastric ulcers, total acidity, gastric fluid volume, bacterial count, and histopathological changes caused by aspirin. On the other hand, both plant water extracts increase the pH

value of gastric fluid. The results of this study indicate that both extracts can be used to cure acute gastric ulcers. Both plant extracts can be additional nutrients that are useful for food ingredients [7].

II. MATERIAL AND METHOD

A. Research Ethics Clearance

The treatment of test animals in this study has received ethical code approval from the KEPK Faculty of Pharmacy Universitas Mulawarman, Indonesia with protocol number 00472164722211320230310080.

B. Appliances

The appliances used in this research were a blender, rotary evaporator, stirring rod, aluminum foil, injection syringe, analytical balance, tweezers, pin and scalpel, glass tools (Erlenmeyer, dropper, beaker, and bottom flask round, measuring cup).

C. Materials

The materials used in this study were red cabbage (*Brassica oleracea* var. capitata L.), distilled water, ethanol 96%, aspirin as an ulcer inducer, cimetidine as a positive control and physiological solution NaCl 0.9% as a gastric lavage after surgery. While the test animals used were mice.

D. Animal Testing

Male mice weighing 20-25 grams in healthy condition. Determination of sample size is done using Federer's formula, namely:

$(n-1) \times (t-1) > 15$

Where: n = sample size of each group

t = number of groups

$(n-1) \times (5-1) > 15$

$(n-1) \times 4 > 15$

$(n-1) > 3.75$

$n > 4.75$

E. Research Methods

Sample preparation

The sample used in this study was red cabbage (*Brassica oleracea* var. capitata L.) obtained from traditional markets in Samarinda, Propinsi Kalimantan Timur, Indonesia. Sample preparation included wet sorting, washing, drying, dry sorting, and making simplicia powder.

Fig. 1: (a) Filtration

(b) Concentration and separation of the extract

Extraction

Red cabbage extraction was carried out by maceration. A total of 142 grams of dry red cabbage powder was put into a maceration vessel then 96% ethanol solvent was added until completely submerged. Maceration was carried out for 3 x 24 hours with occasional stirring. The filtrate obtained from the filtered results was then separated from the solvent at low temperature and pressure using a rotary evaporator until a thick extract was obtained [8,9].

Flavonoid Test

Several milligrams of red cabbage (Brassica oleracea var. capitata L.) ethanol extract were put into a test tube, and then added with 5 mL of ethanol, shaken until dissolved and heated for 5 minutes. After that, a few drops of $HCl_{(P)}$ and a little Mg powder were added. Positive extracts containing flavonoids are indicated by the formation of a dark red color [10,11,12, 13,14].

III. RESULTS AND DISCUSSION

A. Extraction

A total of 142 grams of dried red cabbage powder was extracted by maceration with ethanol for 3x24 hours. The filtrate obtained was separated from the solvent using a rotary evaporator and a thick extract with a blackish purple color of 29.91 grams was obtained. The results of the flavonoid test on the extract carried out using the Wilstarter method by adding a few drops of HCl (p) and Mg powder, to the red cabbage extract solution, produced a color change from yellow to red which indicated that the red cabbage extract positively contained flavonoids.

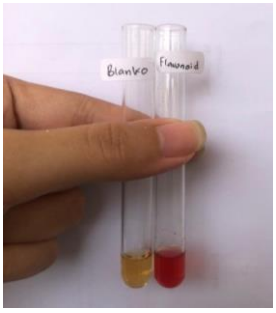

Fig. 2. Flavonoid Testing with the Wilstater Method

B. Anti-Gastric Ulcer Test

The anti-gastric ulcer test was conducted using 25 male mice divided into 5 groups, namely group I (extract dose 21 mg / KgBW of mice), group II (extract dose 42 mg / KgBW of mice), group III (extract dose 84 mg / KgBW of mice), group IV (comparison group with cimetidine 0.52 mg / KgBW of mice), and group V (negative control group given only aquadest). The test was conducted for 6 days, where on the first to sixth days the mice were given a suspension according to their group orally as much as 0.5 ml as an effort to provide initial defense of the animal's stomach, on the 5th and 6th days after being given the suspension, an induction interval of 1 hour was carried out using aspirin as an agent that damages the gastric mucosa of mice. After six hours, the neck was dislocated and the stomach of the mouse

was taken for observation. The following are the results of macroscopic observations of the stomach ulcers of mice.

(a) (b) (c) (d) (e)

Fig.3: Macroscopic Mice Stomach. (a) Group I, (b) Group II, (c) Group III, (d) Group IV, and (e) Group V.

IV. CONCLUSIONS

Anti-gastric ulcer test showed that red cabbage extract can provide protection to the stomach from aspirin exposure. Red cabbage extract has activity as an anti-gastric ulcer with the highest dose of activity being 84 mg/Kg BW of mice.

REFERENCES

I. Oktrinorma WV, Indriyanti N, and Masyithah N. (2020). Pengaruh Induksi Tukak Lambung Menggunakan Aspirin terhadap Kerusakan Jaringan Mukosa Lambung Mencit. *Proceeding of Mulawarman Pharmaceuticals Conferences*. 11 (1): 45–49. doi: https://doi.org/10.25026/mpc.v11i1.392

II. Zahra H, Haridas RB, Gholam GM, and Setiawan AG. (2022). Aktivitas Antiulseratif Berbagai Tanaman Herbal dan Prospek Masa Depan Sebagai Tanaman Budidaya. *J. Sains dan Kesehatan*. 4 (3): 343–353.doi: https://doi.org/10.25026/jsk.v4i3.1046

III. Schellack N. 2012, An overview of gastropathy induced by nonsteroidal anti-inflammatory drugs, *S Afr Pharm J*. 79 (4): 12-18

IV. Pakpahan MG, and Sumiwi SA. 2021, *Review* Artikel: Tanaman Dengan Aktivitas Antitukak, *Farmaka*, 19 (1): 47-53.

V. Zhang W, Lian Y Li Q, Sun L, Chen R, Lai X, Lai Z, Yuan E, and Sun S. 2020, Preventative and Therapeutic Potential of Flavonoids in Peptic Ulcers, *Molecules*, , 25 (4626): 1-31

VI. Mota KSDL, Dias GEN, Pinto MEF, Ferreira AL, Brito ARMS, Lima CAH, Filho JMB, and Batista LM, 2009, Flavonoids with Gastroprotective Activity, *Molecules*., 14(3): 979–1012.

VII. Hadda TB, El Sawry NA. Header EAM, Mabkhot YN, and Mubarak MS. (2014). Effect of garlic and cabbage on healing of gastric ulcer in experimental rats. *Medicinal Chemistry*: 1-10, *Research*. doi: 10.1007/s00044-014-1092-z\

VIII. Erwin, Maulina, S, Bohari, Usman, U, Alimuddin, and Erwin, NA. 2024, Toxicity Test, Antioxidant Activity, and Determination of Total Flavonoid Content (TFC) of N-Hexane and Ethyl Acetate Fraction from Uncaria Nervosa Elmer (Bajakah) Root Wood, *International Journal of Pharmaceutical and Bio-Medical Science*, 04 (08): 699-703, https://doi.org/10.47191/ijpbms/v4-i8-07

IX. Erwin, Rahmadani, IA, Alimuddin, Ridhay, A. 2022, Penentuan Kadar Flavonoid Total Ekstrak Daun, Kulit Batang, Dan Batang Tumbuhan Afrika (*Vernonia amygdalina* Del), *Ulin - J Hut Trop*, 2: 197-203, DOI: http://dx.doi.org/10.32522/ujht.v6i2.8736

X. Mangkasa, MY. 2018. Uji Fitokimia Dan Aktifitas Antioksidan Dari Ekstrak Daun Bawang Kucai *(Allium tuberosum Rottl. Ex Spreng) Menggunakan Spektrofotometer UV-VIS. Pharmacon*. 7(4). https://doi.org/10.35799/pha.7.2018.21417

XI. Saleh, C, Sestiani, M, and Erwin, 2023, Activity of Alang-Alang (*Imperata cylindrica* (L.) P. Beauv) Leaves Methanol Extract as Anti-inflammatory, *Jurnal Sains dan Kesehatan*, 5 (3): 290-296. https://jsk.farmasi.unmul.ac.id

XII. Maulina, S, Pratiwi, DR., and Erwin, 2019, Phytochemical Screening And Bioactivity Of Root Extract Of *Uncaria nervosa* Elmer (Bajakah), *Jurnal Atomik*, 04 (2): 100-102

XIII. Zafar, I, Hussain, AI., and Fatima, T. 2022, Inter-Varietal Variation In Phenolic Profile, Sugar Content, Antioxidant, Anti-Proliferative Activities of Selected Brasssica brassica Species, *Aplied Sciences*, 2 (12): 1-12. https://doi.org/10.3390/app12125811

XIV. Subedi , U., Raychaudhuri , S., Si Fan, Ogedengbe, O, and Obanda, DN., 2024, Fermenting kale (*Brassica oleracea* L.) enhances its functional food properties by increasing accessibility of key phytochemicals and reducing antinutritional factors, *Food Sci Nutr*. 12:5480–5496.DOI:10.1002/fsn3.4195