

# Phytochemical of Ethanolic Extract of Cabbage (*Brassica oleracea*) Collected from Medan, Indonesia

Lela Diyana Br Tarigan<sup>1</sup>, I Nyoman Enrich Lister<sup>2</sup>, Edy Fachrial<sup>2\*</sup>, and Adek Armansyah<sup>2</sup>

<sup>1</sup>Master in Biomedical Science Program, Faculty of Medicine, Universitas Prima Indonesia, Medan, North Sumatera, Indonesia

<sup>2</sup>Faculty of Medicine, Universitas Prima Indonesia, Medan, North Sumatera, Indonesia

**Abstract.** Phytochemical screening of ethanolic extract of cabbage (*Brassica oleracea*) has been successfully conducted. A phytochemical test was performed using FeCl<sub>3</sub> to know the content of the phenolic compound from Cabbage. Cabbage is extracted until the ethanolic extract was obtained. It contained secondary metabolic compounds. mengandung senyawa metabolik sekunder. The largest secondary metabolic in cabbage extract was the flavonoid compound. The flavonoids total contained in the ethanolic extract of cabbage was 1.68 mg QE/g extract and the level of total phenol contained in the ethanolic extract was 45.090 mg GAE/g extract.

**Keywords:** Cabbage, Phytochemical, Flavonoid

Received [1 December 2021] | Revised [19 January 2022] | Accepted [22 February 2022]

## 1 Introduction

Cabbage is a plant that contains carbohydrates, protein, fat, calcium, phosphorus, iron, vitamin A, vitamin B1, and vitamin C. Vitamin C acts as an antioxidant to neutralize toxins and free radicals in the blood and body fluids. In addition, cabbage contains metabolic compounds, namely flavonoids. Flavonoids act as antioxidants and can increase the activity of vitamin C and glutamine compounds which are non-essential amino acids that help regenerate damaged skin cells more quickly (Akbar, 2015).

The cabbage activity is influenced by the presence of secondary metabolic compounds, which are chemical compounds produced by plants that function to protect themselves for survival of these plants. Many secondary metabolic compounds have medicinal effects if consumed by humans, such as flavonoid compounds which have the ability as antioxidants to reduce free radical pressure that can induce degenerative diseases in the human body (Akinmoladun et al., 2016; Sembiring et al., 2015).

\*Corresponding author at: Faculty of Medicine, Universitas Prima Indonesia, Medan, North Sumatera, Indonesia.

E-mail address: edyfachrial@unprimdn.ac.id

Antioxidants work by binding to single and reactive oxygen from free radicals. In order to overcome premature aging, it is necessary to formulate skin care preparations containing antioxidants as active ingredients (Masaki, 2010). Many antioxidant substances come from plants that are collected collectively or called phytonutrients (Percival, 1998). Flavonoids have been reported in many studies that have high activity as antioxidants, antidiabetics, and antibacterials (Sembiring et al., 2015; Ruban et al., 2012; Unuofin et al., 2017; Pretorius et al., 2003; Osadebe et al., 2012 and Puneetha et al., 2013).

## **2 Materials and Methods**

### **2.1 Phytocompound Extraction from Cabbage**

Cabbage samples were purchased from Medan District, Pancur Batu which was selected purposively without comparing it with other products from other areas. Samples were extracted by maceration method using 96% EtOH (ethanol). Samples were soaked for 7 days protected from sunlight. The macerates were concentrated with a rotary vacuum evaporator to obtain a crude extract or later termed cabbage ethanolic extract (CEE).

### **2.2 Phytochemical Screening of Cabbage Extracts**

Screening of phytochemicals present in each extract was based on color forming reaction using indicator reagents (alkaloid, flavonoid, steroid, tannin, glycoside) and formation of foam (saponin). Alkaloid compounds were detected by testing 1.5 mL of CEE with 2 mL of 2% HCl, then reacted with Mayer's reagent until producing a white precipitate or reacted with Dragendroff's reagent until producing orange or red precipitate. Flavonoid compounds were detected by testing 1.5 mL of CEE with 1 mL of 10% FeCl<sub>3</sub> until producing bluish-black or greenish-black colors in the final solution. Steroid compounds were detected by dissolving CEE in 0.5 mL chloroform and 0.5 mL anhydrous acetic acid. The mixture was added with 2 mL of concentrated H<sub>2</sub>SO<sub>4</sub> until producing green color and brownish ring formation in the final solution. Tannin compounds were detected by the appearance of transient greenish to black color in the filtrate of the pre-boiled CEE with 5 mL of 45% EtOH for 5 min. Glycoside compounds were detected by the appearance of red precipitate after being reacted with Fehling's solution A and B. Saponin compounds were detected by testing 1.5 mL of each CEE with 10 mL boiled water, vigorously shaken until producing stable foam for 10 min in a test tube (Harborne, 1984).

### **2.3 Total Phenol Quantification**

A total of 10 mg of CEE was dissolved with 10 mL of methanol to obtain a concentration of 1,000 ppm. Approximately 0.1 mL of the test solution was taken and added with 7.9 mL of distilled water, and 0.5 mL of Folin-Ciocalteu, then homogenized for  $\pm$  1 minute, followed by 1.5 mL of 20% Na<sub>2</sub>CO<sub>3</sub> and incubated for 90 minutes. The absorbance of each solution

concentration was measured on the blank using UV-Vis spectrophotometry at 400 to 800 nm. Gallic acid was used as a positive control (Ditjen POM, 1995).

#### 2.4 Total Flavonoid Quantification

A total of 25 mg of CEE was dissolved in 25 mL of 96% EtOH. One mL of the stock solution was taken and the volume was made up to 10 mL with 96% EtOH. One mL was taken and mixed with 3 mL of 96% EtOH, 0.2 mL of AlCl<sub>3</sub>, 0.2 mL of 1 M potassium acetate, and 5.6 mL of double distilled water. The solution was incubated for 30 min at room temperature and the absorbance was measured on a UV-Visible spectrophotometer at 440 nm. Quercetin was used as a positive control (Ditjen POM, 1995).

### 3 RESULT AND DISCUSSION

The phytochemical screening results of the cabbage ethanolic extract were carried out to determine the content of secondary metabolites contained in it. Phytochemical screening was performed on triterpenoid/steroid, alkaloid, tannin, saponin, flavonoid, and glycoside compounds as shown in Table 1.

**Table 1.** Phytochemical screening test results

No	Pemeriksaan	Extract
1.	Alkaloid	+
2.	Flavonoid	+
3.	Glycoside	+
4.	Saponin	+
5.	Tannin	+
6.	Steroid/Triterpenoid	+

Description : (+) = contain of active compound, and (-) = does not contain active compound

The test results showed that cabbage contains alkaloids, flavonoids, glycoside, saponin, tannin, and steroid or triterpenoid compounds. These compounds indicated that cabbage has potential as an antioxidant in the presence of compounds that have potential as antioxidants i.e flavonoids and tannins.

These compounds acted as antioxidants by scavenging the free radicals. This was due to they contained the hydroxyl groups that can donate hydrogen to free radicals so that the free radicals were paired and converted into non-radicals (Silalahi, 2006).

## Phenol Levels

**Tabel 2.** Phenol total contents

Weight (g)	Volume	Absorbant	Concentration	Average Concentration	Total Phenol (GAE/g extract)
0.0254	0.025	0.0567	45.213	45.8119	45.090
		0.061	48.888		
		0.0545	43.333		

Based on Table 2 showed that the total phenol content in the ethanolic extract of cabbage was 45.090 mg GAE/g extract. Phenol compounds are compounds that have one or more hydroxyl groups attached to an aromatic ring. Polyphenols are compounds that have more than one phenol group. The large variety of groups in the main phenolic framework causes the phenolic group to have many members. There are more than 8,000 types of compounds that are included in phenolic compounds. One example of a phenolic compound is gallic acid which belongs to the phenolic acid group. Gallic acid is a triphenyl that is usually found in tea leaves in the form of esterified together with catechins (Sandrasari, 2008).

## Flavonoid Content

**Tabel 3.** Flavonoid Total Content

Weight (g)	Volume	Absorbant	Concentration	Average Concentration	Total Flavonoid (GAE/g extract)
0.0252	0.0252	0.1556	1.6362	1.7104	1.6834
		0.1576	1.6563		
		0.1758	1.8386		

Based on Table 3 showed that the total flavonoid content in the ethanolic extract of cabbage was 1.6834 mg QE/g extract. One of the flavonoid compounds is quercetin which is known as a potential antioxidant. Most flavonoids have antioxidant activity due to the presence of phenolic hydroxy groups in their molecular structure. When these compounds react with free radicals, they form new radicals which are stabilized by the resonance effect of aromatic nucleic (Hertiani et al., 2000). Phenol and flavonoid compounds have a linear contribution to antioxidant activity, so the higher the compound levels which is the better for the antioxidants.

## 4 Conclusion

Cabbage contained secondary metabolic compounds. The largest secondary metabolic compounds in cabbage extract were flavonoids. The total flavonoid contained in the ethanolic

extract of cabbage was 1.68 mg QE/g extract and the total phenol content contained in the ethanol extract was 45,090 mg GAE/g extract.

## References

- Akbar, R. (2015). *Aneka Tanaman Apotek Hidup Di Sekitar Kita*. Cetakan I. Jakarta: One Books. Hal. 114
- Akinmoladun AC, Olowe JA, Komolafe K, Ogundele J, Olaleye MT, 2016. Antioxidant Activity and Protective Effects of Cocoa and Kola Nut Mistletoe (*Globimetula cupulata*) Against Ischemia/Reperfusion Injury in Langendorff-perfused Rat Hearts. *Journal of Food and Drug Analysis*, 24:417–426.
- Masaki, H. (2010). Role of antioxidants in the skin: anti-aging effects. *Journal of dermatological science*, 58(2), 85-90.
- Sembiring HB, Barus T, Marpaung L, 2015. Antioxidant and Antibacterial Activity of Some Leaves Extracts (Methanol, Ethyl Acetate, and N-Hexane) of *Scurulla fusca* G.Don. *International Journal of PharmTech Research*, 8:24–30.
- Percival, I. (1998). *Quantum state diffusion*. Cambridge University Press.
- Ruban P, Gajalakshmi K, 2012. In Vitro Antibacterial Activity of Hibiscus rosa-sinensis Flower Extract Against Human Pathogens. *Asian Pacific Journal of Tropical Biomedicine*, 2:399–403.
- Unuofin JO, Otunola GA, Afolayan AJ, 2017. Phytochemical Screening and In Vitro Evaluation of Antioxidant and Antimicrobial Activities of *Kedrostis Africana* (L.) Cogn. *Asian Pacific Journal of Tropical Biomedicine*, 7:901–908.
- Pretorius JC, Magama S, Zietsman PC, 2003. Purification and Identification of Antibacterial Compounds from *Euclea crispa* subsp. *crispa* (Ebenaceae) Leaves. *South African Journal of Botany*, 69:579–586.
- Osadebe PO, Okoye FBC, Uzor PF, Nnamani NR, Adiele IE, Obiano NC, 2012. Phytochemical Analysis, Hepatoprotective and Antioxidant Activity of *Alchornea cordifolia* Methanol Leaf Extract on Carbon Tetrachloride-induced Hepatic Damage in Rats. *Asian Pacific Journal of Tropical Biomedicine*, 5:289–293.
- Puneetha GK, Thriveni MC, Murali M, Shivamurthy GR, Niranjana SR, Prakash HS, Sadashiva MP, Amruthesh KN, 2013. Evaluation of A Parasitic Flowering Plant *Dendrophthoe trigona* (Wt. & Arn.) Danser for Its Phytochemical and Antioxidant Activities. *Journal of Pharmacy Research*, 7:20–23.
- J. B. Harborne, *Phytochemical Methods* (Chapman and Hall, London and New York, 1984).
- Ditjen POM, *Farmakope Indonesia* (Departemen Kesehatan Republik Indonesia, Jakarta, Indonesia, 1995).
- Silalahi, J. (2006). *Makanan Fungsional*. Yogyakarta: Kanisius. Halaman 22-29, 54.
- Sandrasari, D. A. 2008. Kapasitas antioksidan dan hubungan nilai total fenol ekstrak sayuran Indigenous. Sekolah Pascasarjana. Institut Pertanian Bogor. (Tesis).
- Hertiani, T., Pramono, S., dan Supardjan A M. (2000). Uji Daya Antioksidan Senyawa Flavonoid Daun *Plantago major* L. *Majalah Farmasi Indonesia* 11 (4).