

Phytochemical Screening of Secondary Metabolites of 96% Ethanol Extract of Coriander Seeds (*Coriandrum Sativum* L.)

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Abstrak: Biji ketumbar adalah rempah-rempah yang secara umum digunakan oleh masyarakat Indonesia tidak hanya sebagai bahan makanan, namun juga sebagai bahan obat. Tujuan penelitian ini adalah untuk mengetahui kandungan metabolit sekunder pada biji ketumbar (*Coriandrum Sativum* L.). Penelitian ini menggunakan metode ekstraksi maserasi dengan etanol 96% sebagai pelarut kemudian dilanjutkan dengan skrining fitokimia. Dari hasil skrining fitokimia ekstrak etanol 96% biji ketumbar (*Coriandrum Sativum* L.), diketahui ekstrak mengandung senyawa golongan fenol, flavonoid, tannin, saponin, triterpenoid dan steroid, serta tidak mengandung alkaloid.

Abstract: Coriander seeds are spices that are generally used by Indonesian people not only as a food ingredient, but also as a medicinal ingredient. The purpose of this study was to determine the content of secondary metabolites in coriander seeds (*Coriandrum sativum* L.). This study used the maceration extraction method with 96% ethanol as a solvent and then continued with phytochemical screening. From the results of the phytochemical screening of 96% ethanol extract of coriander seeds (*Coriandrum Sativum* L.), it was found that the extract contained phenolic compounds, flavonoids, tannins, saponins, triterpenoids and steroids, and did not contain alkaloids.

INTRODUCTION

Indonesia is a country with abundant natural resources, one of which is rich in spices. Indonesia is also often nicknamed the "Mother of Spices" because of its abundance of spices. The use of spices also cannot be separated from the daily life of the Indonesian people. One of them is coriander. Coriander (*Coriandrum Sativum* L) is included in the Apiaceae family (Hijriah et al., 2022). In general, coriander is used as a seasoning for cooking ingredients, but coriander also has a myriad of other benefits such as in the health sector. Coriander has antibacterial, antifungal, antidiabetic, protects against toxins and many others (Nahor et al., 2020; Purnama et al., 2021; Yulianty et al., 2015). The content in coriander fruit includes fibre,

carbohydrates, fatty oils, proteins, essential oils, minerals, sugars, alkaloids, flavones, resins, tannins, anthraquinones, sterols, and many others ((Nahor et al., 2020; Purnama et al., 2021).

Secondary metabolites are one of the chemical compounds present in a plant. These secondary metabolites generally function as a defense against insects. (Hakim & Saputri, 2020). Compounds included in the secondary metabolite group are flavonoids, phenolics, steroids, alkaloids, triterpenoids, tannins, glycosides and anthraquinones. (Wahid & Safwan, 2020).

Phytochemical screening is a method to ascertain the content of chemical compounds contained in a plant extract (W. S. et al., 2013). This is because the content in a plant extract can change according to

geographic location, temperature, climate to soil fertility. Plant extracts can be taken from the leaves, stems, flowers, fruits and even the roots of a plant (Agustina *et al.*, 2016). In this study, phytochemical screening was carried out on the ethanol extract of coriander seeds. Ethanol is an organic solvent which has the benefit of having a high extraction rate, safe for the environment, and does not have toxic properties like other solvents. (Hakim & Saputri, 2020)

Based on the description above, this research was conducted to determine the content of chemical compounds in the 96% ethanol extract of coriander (*Coriandrum Sativum* L.) seeds which have many benefits, especially in the health sector.

METHOD

Preparation of Coriander Seed Ethanol Extract The coriander seeds used were obtained from Denpasar, Bali. The coriander seeds were washed thoroughly using water and dried for three days at room temperature. The dry seeds are blended into a powder. Extra extraction was carried out using the maceration method for 600 grams of powder mixed with two liters of 96% ethanol. Maceration was carried out for three days in an airtight container and room temperature. After three days, the maserate was filtered using filter paper. The resulting macerate is then evaporated to obtain a thick extract of coriander seeds (Rosmiati, 2020). Percent yield is calculated by the formula (Aristyanti *et al.*, 2017)

$$\frac{\text{Berat ekstrak kental}}{\text{Berat ekstrak kering}} \times 100 \%$$

Phytochemical Screening of 96% Ethanol Extract of Coriander (*Coriandrum Sativum* L.) Seeds

1. Examination of Phenol and Tannins
As much as 500 milligrams of 96% Ethanol Extract of Coriander Seeds (*Coriandrum Sativum* L.) was added to 10 mL of 70% ethanol and then allowed to stand for 30 minutes. Take as much as 1 mL of solution and

given 5% FeCl₃ as much as 2 drops. The extract is said to contain phenol and tannins when a blue-black, greenish-black or dark blue color appears in the solution (Simaremare, 2014)

2. Flavonoid Examination
A total of 500 milligrams of 96% Ethanol Extract of Coriander Seeds (*Coriandrum Sativum* L.) was added with 4 mL of alcohol and 0.1 mg of magnesium powder. The extract is said to contain flavonoids if the amyl alcohol layer forms yellow, orange, (Mardiyana *et al.*, 2014)
3. Saponin Examination
As much as 500 milligrams of 96% Ethanol Extract of Coriander Seeds (*Coriandrum Sativum* L.) was dissolved with 2N hydrochloric acid. The solution was then heated for 30 minutes in a water bath. The extract is said to contain saponins if it forms foam in the sample solution (Simaremare, 2014)
4. Alkaloid Examination
A total of 500 milligrams of 96% Ethanol Extract of Coriander Seeds (*Coriandrum Sativum* L.) was mixed with 9 ml of water and 1 ml of 2N hydrochloric acid, then dissolved and heated for 2 minutes. After that, the solution was cooled and then filtered. A total of 0.5 mL of the resulting filtrate was put into two test tubes, Meyer's reagent and Wagner's reagent were added to each of the first test tubes. The extract is said to contain alkaloids if there is a white precipitate with Meyer's reagent and a brown precipitate with Wagner's reagent (Depkes RI, 1995).

5. Examination of Triterpenoids and Steroids

As much as 500 milligrams of 96% Ethanol Extract of Coriander Seeds (*Coriandrum Sativum* L.) was dissolved in 2 ml of chloroform. The sample was then given 3 drops of concentrated sulfuric acid and 10

drops of acetic anhydride. Extracts are said to contain steroids if there is a blackish green or bluish color, and are said to contain triterpenoids if a violet or brownish ring forms at the boundary of the two solvents (Setiawan *et al.* , 2016).

RESULTS AND DISCUSSION

In the maceration extraction process from 600 grams of coriander seeds with a 96% 2000 mL ethanol solution, 33.33 grams of viscous extract was obtained, so the yield obtained was 0.05%. The yield is the ratio of the final extract weight obtained to the initial simplicia weight. The greater the yield, the greater the value of the extract obtained (Senduk, 2020). Extraction is affected by several factors, such as the size, shape and

surface area of the material; extraction temperature; type and amount of solvent (Maslukhah *et al.* , 2016) and speed and duration of stirring (Anggista *et al.* , 2019). The selection of the type of solvent is an important factor because it must be properly considered in order to be able to dissolve the substance being extracted perfectly and to be inert so that it does not react with the components of other substances (Parasetia *et al.*, 2012). In this study using ethanol solvent because it is universal.

Table 1. Results of phytochemical screening of 96% ethanol extract of coriander (*Coriandrum sativum* L.) seeds

Content	Results
Phenol	Positive
tannins	Positive
Flavonoids	Positive
Saponins	Positive
Alkaloids	Negative
Triterpenoids	Positive
Steroids	Positive

DISCUSSION

In this study, the results of 96% ethanol extract of coriander (*Coriandrum sativum* L.) seeds contained phenol, flavonoid, tannin, saponin, triterpenoid and steroid groups, and did not contain alkaloids (Table 1).

Tannins are a group of phenolic compounds that are soluble in water (Muthmainnah B, 2017). Tannins are also

compounds that have OH groups so they tend to be polar (Wahid & Safwan, 2020). Giving drops of FeCl₃ is proof of whether the extract contains a phenol group which, if positive, will give a black-green or black-blue appearance (Muthmainnah B, 2017). When the added FeCL₃ reacts with one of the hydroxyl groups present in the tannin compound, the color change occurs (Puspitasari *et al.* , 2013).

Flavonoids are also a class of phenolic compounds. Just like tannins, flavonoids have polar properties (Putri & Lubis, 2020). The presence of flavonoids was tested using magnesium powder (Wahid & Safwan, 2020). The addition of magnesium powder aims to reduce the bonds between glycosides and flavonoids to break bonds. If the color changes to orange or yellow-red, it indicates a positive sample containing flavonoid compounds (Muthmainnah B, 2017; Putri & Lubis, 2020)

Saponins are triterpene glycoside compounds causing compounds to tend to be polar (Qonitah *et al.* , 2022). The glycoside content present in the extract will hydrolyze to form glucose and other compounds (Rosmiati & Aritonang, 2020) and form foam when added to warm water (Qonitah *et al.* , 2022)

Triterpenoids and steroids are compounds that can be extracted using either non-polar or semi-polar solvents (Wahid & Safwan, 2020). Triterpenoids are non-polar compounds if they are composed of long C30 hydrocarbon chains (Puspitasari *et al.* , 2013) and can be semipolar if they have a cyclic structure containing hydroxyl groups (Qonitah *et al.* , 2022). Tests with acetic anhydride and concentrated sulfuric acid are due to their ability to form blue or green colors on steroids and form red or purple colors on triterpenoids (Wahid & Safwan, 2020).

The precipitate in the examination of alkaloid compounds is formed due to the presence of a nitrogen atom which has a lone pair of electrons in the alkaloid compound and replaces the iodine ions present in the Meyer and Wagner reagents. The precipitate that is not formed indicates that the sample does not contain alkaloid compounds (Putri & Lubis, 2020)

Based on several existing studies, the results obtained were the presence of saponins, triterpenoids, phenolics, tannins, alkaloids, and glycosides in 70% ethanol extract of coriander seeds (*Coriandrum Sativum* L.). There are also alkaloids, steroids,

saponins, and flavonoids, and the absence of triterpenoids in the 96% ethanol extract of coriander seeds (*Coriandrum Sativum* L.) (Rosmiati & Aritonang, 2020; Sitanggang *et al.* , 2021).

Differences in the content of secondary metabolites in each extract can be influenced by two factors, namely external and internal factors. External factors include environmental factors such as season, temperature, nutrients and others, while internal factors include plant age, plant size, morphological differences and other biological factors (Metusalach, 2007; Nurfitriani *et al.*, 2016).

CONCLUSION

Based on the results of phytochemical screening on 96% ethanol extract of coriander seeds (*Coriandrum Sativum* L.) contains phenolic compounds, flavonoids, tannins, saponins, triterpenoids and steroids, and does not contain alkaloids .

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