Antioxidant Activity From Syzygium Cumini (L.) Skeels

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Abstract. Jamblang (Syzygium cumini (L.) skeels) is a local Indonesian plant that has many benefits but is not cultivated and utilized. The part of jamlang which has a lot of benefits is jamblang fruit peel. Some of the compounds contained in the jamblang fruit peel include high antioxidants. This study was conducted to determine the antioxidant activity of jamblang (Syzygium cumini (L.) skeels) rind. Extraction was carried out using maceration method with 96% ethanol solvent, and separated by extract with solvent using a rotary evaporator. Extracts obtained were tested for secondary metabolites and flavonoid positive. Quantitative antioxidant activity testing was measured using a UV-VIS spectrophotometer at a wavelength of 516 nm with standard IC50 and vitamin C values used as a comparison. The results of measurements using UV-VIS spectrophotometer obtained IC50 values of jamblang rind extract and vitamin C were 4.33 ppm and 7.53 ppm respectively. Based on the IC50 value, it can be concluded that there is a very strong antioxidant activity in the jamblang fruit peel.

Keywords: Syzygium cumini (L.) skeels, Antioxidants, IC50 values

1. Introduction

Fruit Syzygium cumini (L.) skeels from Family Myrtaceae which is better known as Jamblang fruit in Indonesia. The fruit has several name terms such as Eugenia jambolana (Lam.), Myrthus cumini Linn, Syzygium jambolanum DC., Syzygium jambolanum (Lam.) DC., Eugenia djouantPerr., Calypanthes jambolananaWllld., Eugenia cumini (Linn.) Druce, Eugenia caryophyllifolia Lam, Indian blackberry, jambolan, jamun, jambul, jambolâo, and various names of plums. In addition to Indonesia, this plant is also widely obtained in India, Bangladesh, Burma, Nepal, Pakistan, Sri Lanka, Malaysia and in various tropical regions, including South America, Madagascar, and the United States (such as Florida and Hawaii) [1]. The fruit is round extending from 1.5 cm to 3.5 cm, purple, blackish purple to almost black, has single fruit and seeds, and is edible (Figure 1) [1].

Antioxidants are bright and attractive natural dyes, which are obtained from various plants, especially from flowers and fruits that are red, purple, blue, and other colors, which are beneficial to health, harmless, environmentally friendly, and easily dissolved in water.
The anthocyanin contained in this fruit function for anti-oxidants and anti-inflammatory (Miguel 2011) (Banerjee et al. 2005) (Sehwag & Das 2014), anti-diabetes (Kumar et al. 2008), inhibiting cancer cells (Li et al. 2009), anti-bacterial and anti-virus (Priya et al. 2013) (Bhowmik et al. 2013), cure abdominal pain and diarrhea (Swami et al. 2012), cleanse the blood (Bhowmik et al. 2013), and various other diseases. (Ruan et al. 2009) also tested antioxidant activity in jamblang plants. The test results showed that the methanol extract of jamblang leaves had IC50 antioxidant activity 125.39 bpj. Jamblang leaves contain flavonol glycosides, quercetin, triterpenoids and tannins [1].

2. Methodology
Fresh Syzygiumcumini (L.) Skeels or fresh Jamblang fruit is taken from trees that grow on the Ladong village estate, Mesjid Raya sub-district, Aceh Besar district, Aceh Province. Chemicals used in ethanol 95%, aluminum foil, testing materials for secondary metabolites include (mercury (II) chloride, potassium iodide, picric acid, bismuth (II) nitrate, hydrochloric acid, iodine, propanol, sulfuric acid, acetic acid, iron (III) chloride hexahydrate, gelatin, sodium hydroxide, ammonia, chloroform and lead (II) nitrate, filter paper, aquades, and DPPH.

2.1. Syzygiumcumini (L.) Skeels Fruit Preparation
The fruit of Syzygiumcumini (L.) skeels was obtained directly from his plantation in the Krueng Raya, Aceh Besar area. Fresh fruits that have been selected are then washed and separated between seeds, meat and skin. The fruit peel obtained is then dried for five days at room temperature to reduce moisture content in the fruit skin and last a long time (Figure 2).

Figure 1. (a) Tree, (b) fruit, and (c) Syzygiumcumini (L.) Skeels flesh

Figure 2. Syzygiumcumini (L.) Skeels bark that has been dried which is then used in the extraction process.
2.2. Maseration of Sample Extraction
20 grams of dried fruit peel was weighed using a digital scale to be used for extraction. The sample is put into a beaker containing 1000 ml of ethanol as it is stirred to make it easier for the solvent to mix with the sample. The place of the sample is closed using aluminum foil paper to prevent interaction between the sample and the surrounding environment and left for 2 days.

2.3. Flavonoids Test
Flavonoid tests are carried out as follows [2]: Jamblang fruit peel extract is added with a few drops of 0.1 M lead acetate solution. The formation of yellow precipitates indicates the presence of flavonoids.

2.4. Antioxidant Test of Jamblang Fruit Skin with DPPH Method
Antioxidant testing was carried out using the DPPH (1,1-diphenyl-2-picrylhyrazil) method as follows (modification [3]):
1. 0.016 mL of jamblang fruit peel extract was taken and put into a 50 mL volumetric flask, then added aquadest to the boundary markers (1000 ppm mother liquor).
2. The mother liquor is taken from the mother's skin sample as much as 0.1; 0.2; 0.3; and 0.4 mL into a 50 mL volumetric flask, then added 5 mL of 0.1 mM DPPH solution and ethanol to the boundary markers to obtain a solution concentration of 2, 4, 6, and 8 ppm.
3. Taken as much as 5 mL of 0.1 mM DPPH solution and added ethanol to the boundary mark (DPPH blank solution)
4. Measured absorbance of each solution for 30 minutes at a wavelength of 517 nm using Spectofotometer UV-VIS
5. Steps 1-4 are repeated for measuring the absorbance of vitamin C.
6. Percent inhibition (% inhibition) is calculated based on the uptake value of DPPH solution before and after the addition of extract through the following equation:
7. \%

\[
\text{% Inhibisi} = \frac{A_{\text{kontrol}} - A_{\text{sampel}}}{A_{\text{kontrol}}} \times 100
\]

Information:
Control = Absorbance of DPPH blank solution
Asampel = Absorbance of the sample
7. Calculation of % inhibition is included in the linear regression value equation with concentration (ppm) as abscissa (X axis) and percent inhibition value as Y axis to calculate IC50.

3. Results and Discussion
3.1 Acquisition of Extracts from the Maseration Method
Syzygium cumini (L.) skeels fruit samples which have been soaked with ethanol solvent a day and night have a solvent color change from colorless to purple which indicates that the extract has been withdrawn by solvent. Flushing is also done so that the remnants of the extract have not been used up by the solvent. The process of separating the extract from the solvent also uses the evaporation process. This separation process takes two hours to mark all the solvents separated from the extract and obtained a volume of 22 ml thicker pure extract.

3.2. Flavonoid Testing
Syzygium cumini (L.) skeels fruit extract contains a number of secondary metabolites such as flavonoids, tannins, and saponins as shown in Table 3.1 below:

| Test | Positive | Negative | Description |
|------|----------|----------|-------------|

3
Based on the phytochemical scaling results, the ethanol extract of Jamblang fruit peel is rich in secondary metabolite compounds such as falvonoid, saponin, tanin and polyphenols. [4] say that flavonoids and phenolic compounds are secondary metabolites that show antioxidant properties.

3.3 Antioxidant Testing of Syzygium Cumini (L.) Skeels Fruit Skin Ethanol Extract

Syzygium cumini (L.) Skeels fruit extract was tested for antioxidant activity using DPPH method compared with ascorbic acid. The absorbance value of DPPH uptake on Syzygium cumini (L.) Skeels and ascorbic acid fruit peel extract can be seen in Table 3.3. IC50 extracts of Syzygium cumini (L.) and ascorbic acid fruit extracts were 4.33 ppm and 7.53 ppm respectively which were calculated based on inhibition (%) of 50% with the equation $y = ax + b$

| No. | Concentration (ppm) | Control (EtOH, Abs) | Absorbance of Ascorbic Acid | Absorbance of Syzygium cumini (L.) Skeels fruit extract |
|-----|---------------------|---------------------|----------------------------|-------------------------------------------------------|
| 1   | 2                   | 0.3                 | 0.071                      | 0.199                                                 |
| 2   | 4                   | 0.064               | 0.15                       |                                                        |
| 3   | 6                   | 0.063               | 0.126                      |                                                        |
| 4   | 8                   | 0.058               | 0.066                      |                                                        |
| 5   | 10                  | 0.057               | 0.048                      |                                                        |

IC50 of Syzygium cumini (L.) skeels fruit extract and ascorbic acid were obtained 4.33 ppm and 7.53 ppm respectively as strong antioxidants. [5] a compound said to be a very strong antioxidant if IC50 is <50 ppm, a powerful antioxidant for IC50 in the range of 50-100 ppm, moderate antioxidants if IC50 ranges between 100-150 and weak antioxidants if it is > 150 ppm.

4. Conclusion

Based on the results above it can be concluded that the jamblang (Syzygium cumini (L.) skeels fruit peel has very strong antioxidant activity based on the IC50 value obtained. IC50 value of Syzygium cumini (L.) skeels and ascorbic acid of fruit peel is 4, respectively 33 ppm and 7.53 ppm.

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