



Antioxidant Activities and Quality Test of Instant Faloak (*Sterculia quadrifida* R.Br.) From East Nusa Tenggara With Added Ginger (*Zingibera officinale* Roch)

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Abstract

Introduction: Faloak is one of the medicinal plants which grows wildy in Kupang-East Nusa Tenggara. People use faloak bark to treat several diseases. The faloak bark is usually processed by boiling and, the cooking water is drunk. Scientifically, faloak bark contains flavonoids which are known to have antioxidant properties. Preparation of faloak in other dosage forms is made so that people have other choices in using faloak. Faloak in the form of instant dosage has been made and has been measured for its antioxidant activity but has very weak antioxidant activity with an IC_{50} value of $2,307.77 \text{ ppm} \pm 58.20 \text{ ppm}$ or $2,249.57 \text{ ppm}$ to $2,365.97 \text{ ppm}$ (Soeharto & Tenda, 2018). Ginger is a plant that is known to have antioxidant activity.

Objective: This study aimed to determine the antioxidant strength of instant faloak by adding ginger based on IC_{50} value and the quality of the preparation. The sample is taken by taking the faloak bark that is not too old. The bark that has been extracted from the juice is then added with sugar and ginger juice and then recrystallized to get instant faloak with a ginger flavor. The instant faloak was identified qualitatively and measured its antioxidant activity against DPPH as a free radical at a wavelength of 517.4 nm using a UV-vis spectrophotometer. The quality of instant faloak preparations is measured including: water content and ash content.

Results: The results showed that instant faloak wick added ginger had very weak antioxidant activity with values of IC_{50} $2,044.2 \text{ ppm} \pm 32.84$ or $2,011.42 \text{ ppm}$ to $2,077.1 \text{ ppm}$, water content of 2.40% and ash content of 1.46%.

Keywords: Instant faloak, Ginger Flavor, Moisture Content, Ash content.

Introduction

The field of medicine and health discuss a lot about free radicals (free radicals) and antioxidants because most diseases are initiated by excessive oxidation in the body. This reaction triggers the formation of very active free radicals that can damage cell function (Winarsih, 2007).

Free radicals are a form of reactive oxygen compounds known as compounds that have

unpaired electrons. These compounds are formed in the body, triggered by various factors. Unwittingly, our bodies form free radicals continuously, both through the process of normal cell metabolism, inflammation, nutritional deficiencies, and due to responses from outside the body such as environmental pollution, ultraviolet (UV) cigarette smoke and others. All these factors

can trigger the emergence of degenerative diseases because it requires certain compounds or substances that can attract electrons or free radicals called oxidants or oxidizing agents (Winarsih, 2007).

Antioxidants are electron donor compounds that can inhibit oxidation reactions by binding to free radicals and highly reactive molecules so that cell damage can be inhibited (Winarsih, 2007). Antioxidant status is an important parameter for monitoring one's health. The human body has an antioxidant system to counteract the reactivity of free radicals which are continuously formed by the body. But because of the excessive amount of free radicals and cannot be broken down by antioxidants found in the body, additional antioxidants are needed from outside the body. Antioxidants are abundant in vegetables, fruits, seeds, nuts, and, some parts of plants such as bark (Winarsih, 2007).

Some plants in East Nusa Tenggara have potential as medicinal ingredients, one of which is Faloak. Faloak is commonly found in the islands of Timor, Alor, and Rote and known by the surrounding community as Flolo. Faloak has been used to cure internal diseases. According to the community's recognition that consuming faloak can increase stamina, reduce fatigue, and fatigue for heavy workers, help cure typhus, ulcers, and liver (Siswadi *et al*, 2016).

Based on the literature of the Faloak (*Sterculia quadrifida R.Br*) contains alkaloids, flavonoids, terpenoids, phenols, steroids, triterpenoids. Substances that have antioxidant properties are flavonoids and triterpenoids (Siswadi *et al*, 2013).

People generally use this plant by cleaning the leaves of the faloak tree, chopped and then boiling until it boils until the water used is reduced to one third and consumed when sick.

Preparation of faloak which is commonly done by these communities has shortcomings including; available must always be prepared fresh when it will be drunk, impractical in its use, unstable in its storage, requires a long time in preparation to get faloak extract, in addition to the retrieval of faloak bark can cause plants to die.

Making Instant dosage forms aims to be easy to carry, practical and, always available when needed. Ginger included in making instant preparations faloak. Ginger is a medicinal plant native to Indonesia (Anonymous, 2001; Anonymous, 2007). The active ingredients of ginger include essential oils (bisabolone, cineol, phellinena, citral, bomoel, citinellol, geranial, linalool, limonene, zingiberol, zingiberene, camphene), oleoresin (gingerol, shogaol), phenol (gingeol, zingerone), enzymes (proteolytic enzymes), zingibain, vitamin B6, vitamin C, magnesium, phosphorus, potassium, linoleic acid. Active substances that have antioxidant properties are gingerol, shagaol and, vitamin C. The purpose of adding ginger to instant faloak is to give a distinctive flavor and aroma to ginger (Youngson, 2005; Widiyanti, 2009; Koswara *et al*, 2012;).

This instant ginger flavored faloak is made by decoction where dried faloak bark is taken with the juice by heating for 30 minutes calculated from a temperature of 90⁰C, then followed by a recrystallization process with the addition of ginger juice and sugar which aims to recrystallize substances dissolved in water. Faloak antioxidant activity has been studied and shows that faloak extract has very strong antioxidant activity with an IC₅₀ value of 18.03 ppm ± 1,081 ppm or 16,494 ppm to 19,111 ppm (Malaise, 2014) but, the leaves of the Faloak tree that have been made in this instant form have not been has been studied.

Materials and Methods

Preparation of faloak powder and ginger juice

Faloak bark used in this study taken from the Penfui area of Kupang City, East Nusa Tenggara. Faloak plants determined by the Department of Pharmacy Biology, Faculty of Pharmacy, Gadjah Mada University. Faloak bark samples obtained were wet sorted and then washed using flowing water to remove any adherent impurities. Samples were then chopped and dried by aerating them to dry then, sorting was dried and pollinated (Figure 1). Ginger used in the study taken in the Penfui village. Ginger is sorted wet then

peeled, chopped and, blended, then filtered to get fresh ginger juice (Figure 1).

Figure 1. Preparation of faloak powder and ginger juice

- (a) faloak tree (*Sterculia quadrifida* R.Br.)
- (b) faloak bark before sorted
- (c) faloak bark after washing
- (d) faloak bark after chopped
- (e) dry faloak bark
- (f) faloak powder
- (g) ginger (*Zingibera officinale* Roch)
- (h) ginger after chopped
- (i) ginger is blended
- (j) ginger juice

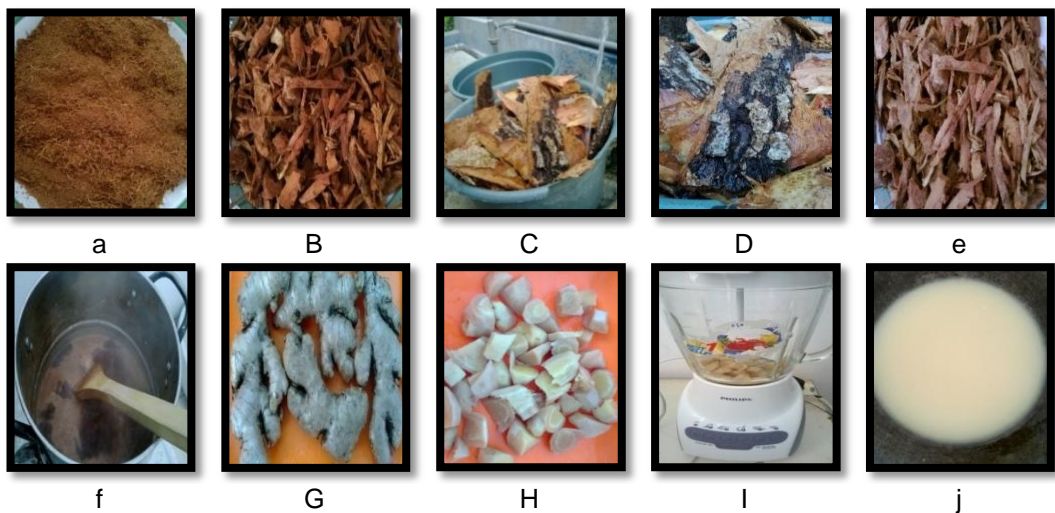
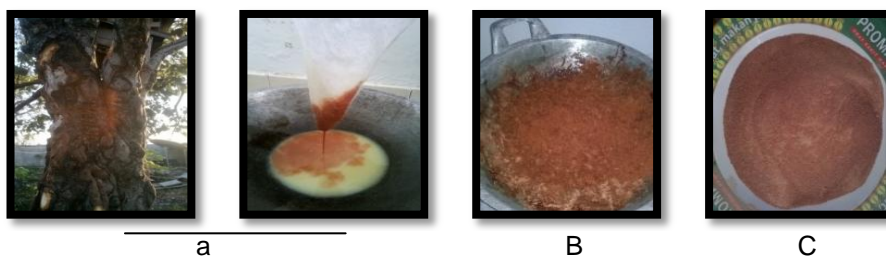


Figure 2. The making process of instant ginger(s) flavored faloak

- (a) the extraction process of faloak powder
- (b) recrystallization process;
- (c) instant ginger(s) flavored faloak product



Made of instant ginger flavored faloak

Faloak powder is added 6 L of water as a solvent and is heated (Dekok) for 30 minutes. The results of the dekok are cooled, filtered to take the juice as much as 1600 mL. The obtained faloak extract is then recrystallized by the addition of granulated sugar and ginger

juice with water solvent to produce faloak in the form of instant or powder (Figure 2).

Qualitative identification of instant ginger flavored faloak**Flavonoid identification**

100 mg of ginger(s) flavored instant faloak powder weighed and dissolved in 1 mL of 95% ethanol, add 0.1 g of magnesium P powder and ten drops of concentrated hydrochloric acid, if a red-orange to purple-red color occurs, indicating the presence of flavonoids. If there is an orange-yellow color, it indicates flavon, chalcone, and euron (Ok & Jeong, 2012.).

Triterpenoid identification

100 mg of instant faloak powder was weighed and dissolved in 20 mL ether for 2 hours; the filtrate was evaporated then 20 concentrated H₂SO₄ added and anhydrous acetic acid one drop. If there is a change in some color, it indicates the presence of a triterpenoid (Harborne, 1987).

Testing the water content (reference SNI 01-2891-1992 point 5.1)

Weighing 1-2 grams of homogeneous samples in a closed weighing bottle was with a known fixed weight. Furthermore, dried with an oven at 105°C for 3 hours then cooled in a desiccator for 15 minutes then weighed. Heating in the oven is repeated several times until getting the same weight.

Calculation:

$$\text{Moisture content} = (W1 - W2) / W1 \times 100\%$$

Information :

W1 = sample weight before drying (gram)

W2 = sample weight after drying (gram)

Testing the ash content of the product (reference SNI 01-2891-1992 point 6.1)

2-3 grams of sample weighed carefully in a porcelain cup with a known permanent weight. Made into charcoal on an electric stove, then ignited in a furnace at 550°C until a perfect graying (the furnace door is open slightly so that oxygen can enter. Cooled in a desiccator, then weighed to a fixed weight.

Calculation

$$\text{Ash content} = W1 / W2 \times 100\%$$

Information :

W1 = sample weight after graying (grams)

W2 = sample weight before graying (grams)

Test the antioxidant activity of instant ginger(s) flavored faloak

Preparation of a 0.5 mM DPPH solution

The reagent solution was 0.5 mM in 95% ethanol solvent. This solution is made by weighing 20 mg of DPPH powder and put into a 100 mL volumetric flask plus 95% ethanol and then shaken to dissolve DPPH powder and 95% ethanol added to the mark (Anonymous, 1979).

Determination of maximum wavelength

Determination of the maximum wavelength of DPPH solution as follows: 1 mL of 0.5 mM DPPH solution plus 4 mL of 95% ethanol and then shaken homogeneously and measured the absorption obtained in the range λ 510-520 nm with blank ethanol

Preparation of solutions.

Ginger flavored instant faloak, dissolved with 95% ethanol to make a concentration of 10,000 ppm which is 1000 mg in 95% ethanol for making 100 mL (solution A), from the solution A made 5 series of concentrations; to make 1000 ppm take 2.5 mL of solution, for 2000 ppm take 5 mL of A solution, for 3000 ppm take 7.5 mL of A solution and to make 4000 ppm concentration take 10 mL of A solution and to make 5000 concentration ppm take 12.5 mL of A solution. Volume pipettes are used to take solution A.

Results and Discussions

Faloak tree or known as flolo by the people of Kupang City is one of the plants with high antioxidant activity because it contains flavonoids. Flavonoid compounds are the largest phenol group in nature. These compounds are generally red and yellow that are easily found in plants, especially in leaves, fruit, flowers, bark and, roots. To obtain activity data from the ginger(s) flavored faloak instant preparations, the ginger(s) flavored phallic

antioxidant activity was tested using the DPPH method.

Instant ginger(s) flavored faloak before is being tested for antioxidant activity, identification of flavonoids and triterpenoids aims to ensure the active ingredients in the sample during the instant manufacturing process. The data of the results of qualitative instant faloak testing is shows as in table 1. Based on testing shows that the instant ginger(s) flavored ginger contains flavonoids and triterpenoids which, are antioxidant compounds.

Another qualitative test for instant faloak is the test for water content. Water content is the amount of water contained in the material expressed in units of percent. Water content is a very important characteristic in instant preparations because water is one of the media that is very suitable for the growth of fungi and bacteria that can damage the active ingredient contained in the instant drink. Data from the test results can be shown in table 2. The water content in instant ginger(s) flavored ginger ranges from 1-2% while according to SNI, the water content requirement for traditional drinks is $\leq 3\%$. Thus the water content contained in instant ginger(s) flavored faloak has met the quality requirements of traditional beverage powder which, is 2.40% <of 3%.

Ash content is one of the qualitative test parameters for instant preparations. Based on the results of the study showed the total ash content found in the instant Faloak ginger(s) flavor was 1.46%. According to SNI 01-4320-1996, the maximum ash content found in traditional powder drinks is 1.5%. The level of instant faloak ash in ginger flavor fulfills SNI requirements as shown in table 3.

Table 3. Ash content of instant ginger(s) flavored faloak

Replication	Ash content (%)
	Instant ginger(s) flavored faloak
I	1.4700
II	1.4600
III	1.4600
Average	1.4600

(Source: Primary Data, 2017)

Ginger flavored instant faloak was tested for antioxidant activity using the DPPH method.

Anti-oxidant activity test based on the loss of purple color due to the reduction of DPPH by antioxidants contained in ginger(s) flavored instant faloak. The intensity of the missing purple color will be measured using visible spectrophotometry at a wavelength of 517.4 nm with a DPPH absorbance of 1.082.

According to Gandjar & Rohman (2007), the wavelength determination of a test solution needs to be done because around the maximum wavelength, the shape of the absorbance curve is flat and in these conditions, the Lambert-Beer law will be fulfilled if the absorbance is between 0.2-0.8.

Tests were carried out on five series of test solution concentrations, 1000 ppm, 2000 ppm, 3000 ppm, 4000 ppm and, 5000 ppm to be reacted to DPPH by using the time at each concentration for 30 minutes. The ability of ginger to taste instant faloak in reducing free radicals can be shown from the reduced intensity of the color of DPPH solution which changes from purple to yellow. This color change indicates that there was a reaction between the hydrogen atom released by the test material with the DPPH radical molecule to form a yellow 1,1-diphenyl-2-picrylhydrazil compound. The greater the concentration of the test material, the stronger the yellow color produced. Reducing the intensity of the purple color of this DPPH solution can be quantitatively calculated from the reduction in absorbance of the solution. The greater the concentration of the test material the smaller the absorbance reads, which means the activity of the test material in capturing purple DPPH radicals is greater as in figure 3. The greater the concentration of instant ginger(s) flavored faloak, the greater the scavenging activity. In other words, the concentration of a solution affects the amount of free radical molecules that can be reduced, this can be seen from the change in color that is getting yellow at a greater concentration of the solution. The relationship between concentration, percent reduction, absorbance can be seen in table 4. The ability to reduce free radical DPPH expressed by IC_{50} . The IC_{50} value of instant ginger(s) flavored faloak is 2,044.26 ppm \pm 32.84 ppm or 2,011.42 ppm to 2,077.1 ppm so, it is categorized as a very

weak antioxidant category (Edhisambada, 2011). Factors that might influence the low antioxidant activity found in instant faloak ginger taste is the amount of active substance contained in instant phallic ginger flavor with a very small concentration. Another factor that might influence is the extraction method of faloak powder by a decoction. Intake of active substances at uncontrolled temperatures during the process of decoction may cause damage to active substances that have antioxidant properties found in instant faloak, causing low antioxidant activity, but this needs further testing.

Conclusion

Based on the results of research that has been done, it can be concluded that the instant

faloak of ginger flavor has very weak antioxidant activity with $IC_{50} 2.044.2 \text{ ppm} \pm 32.84 \text{ ppm}$ or $2,011.42 \text{ ppm}$ to $2,077.1 \text{ ppm}$, water content: 1,884%; ash content: 1.46%. The next researcher is expected to increase the weight of the faloak bark to be extracted and modify the method of extracting the faloak bark by indirect heating which aims to increase the antioxidant activity of instant faloak.

Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this work.

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