

Comparison of Tannin Concentration on Fresh and Dried Tea Leaf (*Camelia sinensis* L.) Extract Using UV-Visible Spectrophotometric Method

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Abstract—One of herbal plants that is cultivated as a material for making traditional medicines is tea (*Camelia sinensis* L.). Parts of plants that are used as traditional medicine were fresh or dried leaves. Tea leaves contain tannins which are known as active compound used to treat diarrhea, stop bleeding and treat hemorrhoids. This research aimed to determine tannin concentration on fresh and dried tea leaf extract using UV-Visible spectrophotometric method. The type of this research used quantitative research with experimental design use t-test. This research used a sampling technique that is purposive sampling. The results of the analysis of tannin concentration using UV-Visible spectrophotometric method on fresh and dried tea leaf extract were $3,64 \pm 0,105276$ mg GAE/gram sample and $3,87 \pm 0,019088$ mg GAE/gram sample respectively. Tannin concentration on dried tea leaf extract was higher than on fresh tea leaf extract. After was analyzed statistically with independent sample test (T-test), the result showed that tannin concentration on fresh and dried tea leaf extract were insignificantly different. Because of the value of sig was $0.052 > 0.05$.

Keywords— tea leaves, ekstrak, tanin, spektrofotometri UV-Visibel

I. INTRODUCTION

Tea (*Camelia sinensis* L.) is a type of herbal plant originating from China. This herb is widely cultivated in southeast Asia as a raw material of traditional medicinal manufacture (herbal medicine) [1]. Empirically tea is used in overcoming several diseases such as headaches, diarrhea, the Penghitam, and Hair, cholesterol and high blood triglycerides, diabetes, Tanner and others. Tea is rich in chemical content such as caffeine 2-3%, theobromin, Theofilin, tannins, xantin, adenine, essential oils, quercetin, naringenin and natural fluorid. Tannins contain epigallocatechin substances errors that are able to prevent gastric cancer and esophagus [2]. One way of using tea can be used in the form of simplisia. Simplisia consists of two kinds, namely fresh and dried simplisia. In the process of preparation of fresh simplisia that will be made extracts include the stages of wet sorting, washing, wetting and when necessary to desecting while the preparation of dried simplisia can be done from the stage of wet sorting, washing, incisions, pericles, drying and dry sorting [3].

Drying process is one of the steps that is important because in addition to the quality of physical simplisia will also affect the content of the active compounds, above the compounds that are thermolabil. Tannins are very complex organic substances and consist of phenolic compounds that are widely found in various plants. Generally tannins spread almost all parts of the plant such as the bark, stems, leaves and fruits [4]. Tannins is a polar compound that is resistant to heating so that the research uses extraction by way of infundation [5]. Although it is known that the tea leaves (*Camellia sinensis* L.) contain tannins, but not much research on the tannins rates on fresh and dried tea leaf extracts. Therefore, researchers are interested in analyzing the tannins levels of fresh and dried tea leaf extract (*Camellia sinensis* L.).

II. METHOD

A. Tools and Materials Research

The tools used in this research are oven, test tube, test tube shelf, glass beaker, measuring cup, filter paper, UV-Vis pectrophotometry, measuring flask, measuring cup, drip dropper, filter paper, glass funnel, micropipette. The ingredients used are fresh tea leaves. 3 ml fresh tea Leaf extract, 3 ml dried tea leaf extract, 3 drops of FeCl₃ 1%, 1 ml of gelatin solution. Acid Error 10 mg, Aquabidestilata, Follin Ciocalteu and Na₂CO₃

B. Research Procedures

The procedure is done by first collecting the tea leaves from Kemuning, Ngargoyoso, Karanganyar which is 8-14 days. The leaves were obtained and then made a dry simplisia with an oven at a temperature of 45 ° C for 6 hours. After obtained dry simplisia then done extraction on fresh and dry Simplisia with Infundation method. Extracts obtained and then carried out preliminary test is the qualitative test of tannin, namely:

- Test with FeCl₃ 1%. Each 3 ml sample was added 2-3 drops of FeCl₃ 1% solution. Positive results are shown with the formation of black blue bluish or greenness.

- Test with gelatin. Each sample as much as 3 ml is added 1 ml of gelatin solution when the white deposits occur indicating the presence of tannins.

After the preliminary test was made the raw solution was to weigh the error as much as 100 mg added aquabidestilata up to 100 ml then homogenized, resulting in a raw solution concentration of 1,000 ppm. The raw solution was carried out by dilution 5 times with a concentration of 20 ppm, 40 ppm, 60 ppm, 80 ppm and 100 ppm.

Further determination of the wavelength. Solution of raw acid error as much as 1 ml was inserted into a measuring flask 10 ml and added 0.5 ml of Follin Ciocalteu reagent and 1 ml of Na₂CO₃ saturated solution then added aquabidestilata to 10 ml. Blended well then the absorption is read at length 400-800 nm waves to obtain wavelengths with maximum absorption.

After the manufacture of raw solutions then the manufacture of raw curve is a series of acid raw solution of error with a concentration of 20 ppm, 40 ppm, 60 ppm, 80 ppm and 100 ppm taken respectively 1 ml and put in a measuring flask 10 ml. Into the flask is added 0.5 ml of reagent Follin Ciocalteu and 1 ml of Na₂CO₃ saturated solution then added aquabidestilata up to 10 ml. Mixed well then the absorption is read at the maximum wavelength.

The preparation of the sample solution by measuring 2 ml of the extract diluted with aquabidestilata to 10 ml. Dipipet as much as 1 ml and inserted in the 10 ml flask, then added 0.5 ml of Follin Ciocalteu reagent and 1 ml of Na₂CO₃ saturated solution Then added aquabidestilata up to 10 ml. Well blended then the absorption is read at the maximum wavelength.

Tannins levels are determined by linear regression. Processing of the resulting data is first done by the standard curve method, linear regression $y = bx + A$ is made based on the data absorbance and concentration of the standard solution, where:

$$y = \text{absorbance}$$

$$a = \text{intercept}$$

$$b = \text{slope}$$

$$x = \text{concentration}$$

Tannins levels are obtained in samples as much as 2 ml.

Analysis of the results of this research was obtained from univariate analysis. Univariate analysis aims to explain and describe the characteristics of each research variable [6]. The variables of this research are tannins levels found on fresh and dried tea leaves (*Camellia sinensis* L.).

III. RESULT

Preliminary test with color reaction on fresh and dried tea leaf extract (*Camellia sinensis* L.) According to the Table 1 it can be seen that fresh and dried positive tea leaf extracts contain tannins. The calibration curve of standard solution acid compounds error is obtained the Intercept value of 0.211 and the slope value of 0.007 so that the equation is obtained linear regression i.e. $y = 0,007x + 0.211$, with the value y is the absorbance value and x is the concentration of the sample (ppm).

Table 1. Preliminary test

Screening of phytochemistry	reagent	Sample		Standard
		fresh	dried	
Tannins test	FeCl ₃	Blackish blue	Blackish blue	Blue blackish
	NaCl +Gelatin	White precipitate	White precipitate	White precipitate

Based on the measurement of absorbance on fresh and dried tea leaf extract sample obtained the following data:

Table 2. Results of measurement of absorption of fresh and dried tea leaf extract (*Camellia sinensis* L.)

Extract	Replication	Absorbance	Average of absorbance
Fresh tea leaf	I	0.704	0.720
	II	0.732	
	III	0.726	
Dried tea leaf	I	0.753	0.754
	II	0.752	
	III	0.757	

Based on the Table 2 the average absorption rate of dry tea leaf extract is 0.754 higher than the average value of the fresh Tea leaf extract absorbance of 0.720. The absorption rate at the sample measurement is then calibrated with the linear regression equation of the standard solution curve with the equation $y = 0,007x + 0.211$, resulting in a sample concentration on fresh and dried tea leaf extracts. From the absorbance obtained then at the concentration obtained tannins as follows:

Table 3. Result of concentration calculations on fresh and dried tea leaf (*Camellia sinensis* L.)

Extract	replication	Concentrations (ppm)	Average concentrations (ppm)
Fresh tea leaf	I	70,42	72,80
	II	74,42	
	III	73,57	
dried tea leaf	I	77,42	77,56
	II	77,28	
	III	78	

According to table 3 showed that the content of tannins compounds in fresh tea leaf extract was obtained the average value of concentration of 72.80 ppm while the dried tea leaf extract was obtained the average concentration value

of 77.56 ppm. So that the tannins rate of dried tea leaves extract is higher than the fresh-leaf tannins extract.

The concentration gained on each sample is then converted to GAE (Gallic Acid Equivalent). GAE is a common reference for measuring a number of phenolic compounds found in an ingredient. GAE can be interpreted as mg concentration of extracts per gram of sample (mg/g). The result of GAE concentration on fresh and dried tea leaf extracts can be seen in Table 4.

Table 4. GAE concentration calculation results on fresh and dried tea leaf extract (*Camellia sinensis* L.)

Extract	Replication	concentration (mg GAE/gram sample)	Average concentration (mg GAE/gram sample)
Fresh tea leaf	I	3,521	3,64 ± 0,105276
	II	3,721	
	III	3,678	
dried tea leaf	I	3,871	3,87 ± 0,019088
	II	3,864	
	III	3,9	

Based on Table 3.4 concentration of tannins compounds on fresh tea leaf extract obtained the average value of concentrations of 3.64 ± 0.105276 mg GAE/gram samples while on dry tea leaf extract obtained the average concentration value of 3.87 ± 0.019088 mg GAE/ grams of samples. So the tannins in the dried tea leaf extract are higher than the tannins rate of fresh tea leaf extract.

According [7] the difference of tannins in fresh and dried tea leaves can be because the content of the active ingredient in the plant is influenced by several factors, among others:

place of growth, degree of maturity, varieties, parts of the plant used, the way of harvest and drying process. In this study the difference in the tannins rate of fresh and dried tea leaves based on differences in the process of making simplisia, ie without drying and drying.

IV. CONCLUSION

Based on the results of the study can be concluded Tea leaf extract (*Camellia sinensis* L.) is fresh and dried which is used positively containing hydrolyzed tannins. Concentrations of tannins based on research using UV-Visible spectrophotometry methods on fresh tea Leaf extract (*Camellia sinensis* L.) show that tannins levels of 72.80 ppm or 3.64 ± 0.105276 mg of GAE/gram samples. Concentrations of tannins based on research using UV-Visible spectrophotometry methods on dried tea leaf extract (*Camellia sinensis* L.) indicate tannins levels of 77.56 ppm or 3.87 ± 0.019088 mg of GAE/gram samples.

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