Study of Green Tea Catechin Dipped with Moringa Leaves

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Abstract: Green tea has been widely consumed by people in Asian countries since centuries ago. Green tea is a second drink that is often consumed by people in Japan and China after water. However, in Indonesia this green tea has just evolved a while ago. The development of green tea in Indonesia is also associated with health benefits. Green tea contains polyphenols components especially catechins. Most catechine content is found in green tea compared to black tea or oolong tea. The efficacy of green tea is thought to be nicer if there is the addition of kelor leaves. But until now there has been no assessment of the problem. The purpose of this research is to know the content of green tea catechins on drying and the addition of different kelor leaves. The research was conducted in laboratory instrumentation Faculty of Agricultural Technology of Andalas University in May-June 2019. The study was conducted using exploratory methods comparing the content of catechins to green tea on drying and percentage of of different kelor leaves. Drying is done at room temperature and sun temperature. Percentage of the addition of the leaves are 5, 10, 15, 20 and 25 percent. The raw materials of tea leaves are purchased at PT Mitra Kerinci Solok Selatan and Kelor leaves obtained in Padang city. The results showed the content of catechins in green tea bags by drying the room temperature on the addition of the kelor leaves as much as 10% showed the highest catechin rate of 22.85% while on drying the sun with the addition of kelor leaves Shows the content of catechins 16.33%.
Keywords: Green Tea, Catechin, Moringa

1. Introduction

Green tea is a second drink that is often consumed by people in Japan and China after water. However, in Indonesia this green tea has just evolved a while ago. The development of green tea in Indonesia is also associated with health benefits. Green tea contains polyphenols components especially catechins. Most catechine content is found in green tea compared to black tea or oolong tea. This difference is due to differences in the handling process after the tea leaves are harvested. Black tea is a brownish black tea that is produced through the fermentation process. Green tea is green and is produced through a quick-to-steam process to inhibit fermentation causing the leaf discoloration. The Oolong tea resembles a black tea and green tea, which is a half-fermented tea or its fermentation is discontinued before the process is perfect. Oolong tea is greenish brown with a more "rich" flavor of green tea, but more "soft" than black tea [1].

Catechins are polyphenols that function as antioxidants. As we already know, antioxidants are very good for the body, as it can neutralize and capture free radicals. Based on the results of the study, it is known that there are 30% catechin compounds in a green tea sheet. Free radicals are not only

produced from biochemical reactions in the body, but also found in daily life, such as the smoke of motor vehicles, cigarette smoke, excessive evaporation of alcohol, preservatives, fertilizers, ultra violet rays, and others. Free radicals are high-energy particles that the body generates from the metabolic process used to kill viruses and bacteria. In the body, these free radicals are in very small quantities, however, if they are already in large numbers then these radicals become dangerous and can cause a wide range of diseases, such as cancer, coronary heart, premature aging and so on [1].

There has been a lot of research done to know the health benefits of green tea. Based on research conducted by [2], it is known that catechins in green tea can prevent the occurrence of skin, breast, prostate and lung cancers. In addition, green tea is also very good for preventing nerve deterioration, such as Alzheimer's disease, as well as Parkinson's disease. Green tea is also excellent in preventing cardiovascular diseases (heart and cardiovascular disease), functioning as an antidiabetic and anti-aging premature. All these benefits are given by green tea due to its antioxidant activity.

Although it has many benefits for health, but a strong consumption of tea and too much can cause problems, especially for those who consume low substance. It is caused by tannins and polyphenols contained in the tea can interfere with the absorption of iron in the body. Tannins and polyphenols will bind to iron forming a complex bond that does not dissolve in the human digestive system. Consequently, the iron can not be absorbed by the body and will be excreted through the feces which eventually causes anemia due to lack of iron. However this can be solved by consuming tea 2-3 hours after meals and also increase the consumption of proteins. In addition, excessive content of tannins in the body can also be neutralized by the use of vitamin C and balanced food consumption [1].

Indonesia State is an agrarian state that can suffice food needs for its people from the agriculture sector. Processed products from the agriculture sector can be a raw material for food and drink that is very influential for the survival of Indonesian people. The result of the processing of beverages sourced from agriculture sector is very necessary for the community to help in the body's metabolic process, relieving thirst and to maintain the health of the body. One of the popular types of beverages among the people is the tea [3].

Tea is the most frequent beverage consumed by most of the world's population with an average consumption of 120 ml/day. Black tea is generally in consumption in Europe, the northern part of America and the northern part of Africa (excluding Morocco) while green tea is consumed in the Asian region, many oolong teas in consumption in China and Taiwan. All types of tea beverages come from tea leaves (Camellia sinensis) [4].

Tea made from bud and tea leaves are divided into several types, including green tea (green tea), black tea, oolong tea, and white tea, fragrant tea, flower tea (jasmine tea), and yellow tea (yellow tea). According to [5], the benefits of tea as an antioxidant and antimicrobial properties. Some of the tea processing products that are well known by the public by means of packing include tea bags, filtered teas, tea brewed, tea press, tea sticks, and instant tea.

Green tea is a young leaf of tea plant (Camellia sinensis) that is processed without going through the fermentation process. Tea is one of the favorite drinks that is widely liked and consumed by people around the world as well as most people utilize tea as a refreshing drink and nourish [6]. The tea plant (Camellia sinensis) is a species of plant that leaves and leaf tops used to make tea.

Research [7] reports that green tea polyphenols can improve the body's defence system against infections, namely assisting in the process of phagocytosis by inhibiting the way the enzyme works hialurondase so that macrophages will still function well. Consumption of tea beverages, especially green tea [8] mentions that to be able to reduce the risk of cancer of the gastrointestinal tract is to consume 10 cups or more green tea.

Nowadays the utilization of kelor leaves as food and beverage products are developing, because leaves have good benefits for health. Herbal drink is one of the natural plant-based drinks that efficacious for the body. The herbal drink is made with a base of spices, roots, leaves, seeds, stems, bulbs and fruit. Refreshing drinks that are able to treat various diseases can be produced in a traditional or modern way. One of the ingredients that can be processed in a traditional way and very beneficial is green tea and kelor leaves, both of these plants have a very high antioxidant, and can be

useful to treat a variety of diseases, one of which is to treat people with ovarian cancer suffered by women.

Antioxidants are an important compound in maintaining the health of the body as it acts as a free radical catcher that is widely formed in the body. Antioxidant function is used as an effort to minimize the oxidation process of fats and oils, reducing the occurrence of damage processes in food, as well as extending the life of materials in the food industry. Lipid peroxidase is one factor that is quite a role in damage during the storage and processing of food [9].

In recent years, there is a tendency for people to return to nature, thus making the Community return to the medicinal plants. It is not separated from some chemical drugs, such as side effects, high drug resistance, accumulated in the body, and the price is so expensive. The state of the prolonged economic crisis that struck Indonesia makes health costs increasingly expensive. Chemical medicine has become a luxury item for some Indonesians, so that the plant has begun to look back as an alternative treatment that can be obtained from various plants around us [10].

The leaf kelor (Moringa oleifera) is a typical plant of tropical region that easily grows in Indonesia. Kelor leaves have been widely known in Indonesia, especially in rural areas, but not widely utilized as food products. Kelor leaves contain a variety of beneficial chemical substances. Phytochemicals in the Kelor are tannins, steroids, triterpenoids, Flavanoids, Saponins, Antarquino, and alkaloids, which are all antioxidants [11]. The Kelor plant is rich in pro vitamins A and C, specifically β-carotene, which will be converted into vitamin A in the body and significantly affects hepatoprotective [12].

Some studies reveal the benefits of the kelor leaves, among them, the leaves of the kelor as anti-anemia [13]. The leaves and stem of the kelor can also be used as a lowering of high blood pressure and diabetes medication [14]. According to research results [15] dried kelor leaves per 100 g contain water 0.075%, 2.05% calories, 0.382% carbohydrate, 0.271% protein, 0.023% fat, 0.192% fiber, 20.03%, calcium, 3.68% magnesium, 2.04% phosphorus, 0.006% copper, 0.282% iron, 8.7% sulfur, and 13.24% and 10% flavonoids.

From the results of the explanation above, researchers have been conducting research related to the utilization of kelor leaves and tea leaves with the title "Green Tea-dip catechin study mixed with Kelor leaf".

2. Methods

This study was conducted in the Agricultural Technology Laboratory of Agriculture University of Agriculture and Instrumentation Laboratory of the Agriculture Faculty of Agricultural Technology, University of Andalas Padang, West Sumatera. This study was implemented in February to April 2019.

The raw materials used in this research are green tea from PT. Mitra Kerinci, and kelor leaves that buy in Padang morning market. The ingredients used for chemical analysis consist of: (1). The Cathechin test is ethyl acetate p. A, Standard catechin.

The tools used in this study are ultra violet spectrophotometer tools; Quartz cuvettes; Ultrasonic bath; Analytical balance; Blender An investigation; Takar Flask 50 mm; Watch Glass; Petri clouds; Oven Regular filter funnel; 2 mm pipette; Lid Erlenmeyer with 100 mm of sharpening; Qualitative filter Paper No. 42.

2.1 Research draft

The research plan used in this research is an exploratory study comparing the addition of the powder of the leaf kelor by drying. The treatment in this study was the addition of kelor leaf powder to green tea bags, namely: first: A = 5%; B = 10%; C = 15%; D = 20%; E = 25% and second: (P) Sun drying, K (room temperature drying).

2.2 Kelor Leaf Green Tea formulation

The green tea formulation is made by varying the concentration with kelor leaf powders. Kelor Leaf tea formulations can be seen in Table 1.

Table 1. Formulations of addition of the kelor leaves against green tea in 50 g modified material [16].

Materials	Unit	Treatment				
		A	B	C	D	E
Green Tea Powder	G	47,5	45	42,5	40	37,5
Kelor leaf Powder	G	2,5	5	7,5	10	12,5
Amount	G	50	50	50	50	50

2.3 Implementation of Research

The raw material to be used in this research is green tea from PT Mitra Kerinci and Kelor leaves from the Padang morning market. The implementation of the following research:

2.3.1 Making green tea [17]

The way of making green tea is as follows: (a) preparation of green tea as much as 2 kg. (b). The maid is done at room temperature 270C for 10 hours, performed on the thin layer net (para-para), reversed by 3 times, given the air flow using a fan. (c). Drying is carried out in two ways, which is the use of sunlight and drying at room temperature for 2 days. (d). Milling (size reduction) using blender. (e) The sieve using the size of 60 mesh.

2.3.2 Kelor leaf powder manufacture [17]

The way of making kelor leaf powder is as follows: (a) preparation of the leaf of the kelor leaves as much as 1 kg. (b) carried out with a temperature of 270C for 10 hours, performed on the thin layer net (para-para), reversed by 3 times, given the air flow using a fan. (c) Drying is carried out in two ways, namely the use of sunlight and drying at room temperature for 2 days, (d). Milling (size reduction) using a blender. (e) Then sifted using a sieve with a size of 60 mesh.

2.4 Observation variables

Analysis of green tea bags with the addition of Kelor leaf powder as in table 1 above by drying differently is the rate of catechins. The analytical procedure refers to SNI 01-3391-2000.

3. Results and Discussion

3.1 Sample preparation

Drying on the leaves and leaves is done so that the sample is easy to soften to the powder of the leaf, dau kelor powder and facilitate the extraction. The process gives a yield value of 17.24%. Samples used in the form of powdered tea leaves mixed with kelor leaves.

3.2 Extraction of catechin compounds

The extraction process is an active component withdrawal using certain solvents [18]. The active part of the tea leaves is a catechine compound using maceration methods. The selection of maceration methods in this study is because the catechine compounds are susceptible to heat. The extraction process will take place optimally with the availability of sufficient contact time between solvent and sample. During the immersion process is done several times to improve the contact between the solvent and the sample. The Tea Leaf extract obtained is green.

Tea Leaf extract is partition with chloroform to take non-polar compounds, such as fats, chlorophyll, and caffeine. The addition of chloroform is repeated to maximize the process of taking compounds that are non polar. The addition of chloroform leads to the formation of two phases: water phase and chloroform phase. The chloroform phase is discarded and the water phase is taken to phase two partitions.

The water phase is partition with ethyl acetate. The addition of ethyl acetate serves to take catechin compounds. The addition of ethyl acetate is repeated to maximize the retrieval of catechine compounds. At this stage two phases are the water phase and ethyl acetate. The water phase is

discarded and the ethyl acetate phase is taken. The ethyl acetate phase is yellow with a weight of 3.52 g. This phase is concentrated with a rotary evaporator so that the extracts are obtained. This evaporation process is done to remove the remaining ethyl acetate.

3.3 Catechin extract measurement with Ultraviolet spectrophotometer

The separation of catechins from Tea leaf extracts mixed with kelor leaves is performed using ethyl acetate. The use of ethyl acetate on this separation aims to be able to separate the catechin compounds contained in the tea leaves mixed with kelor leaves. The result of this extract is with a variation in the drying form as shown in table 2.

Table 2. The percentage of Catechin tea leaves are mixed with kelor leaves with variations in drying

	No	Sample	Spectro	et/ec	ws/w		x100%
WL279.0	STDR	0.0521	0.637				
Sunlight Drying	5%	0.0526	0.051	0,080062794	0,990494297	0,079301741	7,930174117
	10%	0.0551	0.110	0,172684458	0,945553539	0,163282401	16,32824008
	15%	0.0530	0.096	0,150706436	0,983018868	0,148147271	14,81472705
	20%	0.0564	0.028	-0,043956044	0,923758865	0,040604785	4,060478529
	25%	0.0536	0.061	0,095761381	0,972014925	0,093081492	9,308149207
Room temperature Drying	5%	0.0534	0.026	0,040816327	0,975655431	0,039822671	3,982267064
	10%	0.0544	0.152	0,238618524	0,957720588	0,228529873	22,85298735
	15%	0.0584	0.056	0,087912088	0,892123288	0,078428421	7,842842089
	20%	0.0537	0.12	-0,188383046	0,970204842	0,182770143	18,27701429
	25%	0.0528	0.023	0,03610675	0,986742424	0,035628062	3,562806241

Note: Et 279 is Absorban/absorption solution example at wavelength 279 mm; Ec 279 is the absorption of standard solution at the wavelength of the 279 mm; Ws is the standard catechin weight, expressed in mg; and W is the heavy example of Gambir, expressed in mg.

$$\%\ Catechin = \frac{et\ 279}{ec\ 279} \times \frac{ws}{w} \times 100\% \quad (1)$$

According to table 2, the rate of green tea catechins with a mixture of 10% kelor leaves in the room temperature drying indicates the largest cathekin rate of 22.85%. This indicates how many Katechins are formed. The formation of catechins depends on the interaction between the compound molecules and the solvent and the interaction between the compounds and the silent phase. Eluen Ethyl acetate is somewhat polar and its efficacy is almost the same as the catechine extract that is separated so that More stains obtained. According to [19]. Ethyl acetate is a good solvent to separate the catechins.

The silent phase type can also affect the process of catechine separation. The silent phase used is silica gel. Silica gel is a form of silicon dioxide (silica). On the surface of silica gel there is Si-O-H bond besides Si-O-Si. The silica gel surface is very polar and hence the cluster-OH can form a hydrogen bond with the corresponding compounds around it [20].

The presence of catechin compounds on stain samples is identified with the reagent $FeCl_3$. This reagent is widely used to identify the phenol compounds especially catechins and will produce a bluish

black color [19]. The results of the identification indicate a catechin on the stain sample. The identification plate reinforced with illumination under the UV lamp at a wavelength of 254 nm. The pale blue color formed indicates the presence of catechins on the stain. The stain will form a pale blue color when steamed and illuminated UV lamps. Based on discoloration, these stains are thought to be catechine compounds. According to [19] the stain on the plate will turn into a pale blue color in the after steamed with ammonia and examined under ultraviolet light (UV). In addition, the presence of catechin compounds is also shown in the formation of bluish black color after sprayed with a solution of $FeCl_3$. A compound reacted with $FeCl_3$ in the case of bluish black, is evidence of 3, 4, 5-phenol trihydroxy (like Galokatekin).

4. Conclusion

Green Tea Leaf extract mixed with 10% of the kelor leaves on the drying room temperature indicates catechin levels of 22.85%, while on drying with sunlight at 16.33%. .

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