Quality of Kahwa's Leaves Hard Candy in Terms of Food Chemistry

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Abstract

Kahwa's leaves hard candy is known as one of the very popular food products by the community with variety of form and taste. The purpose of this research is to produce hard candy from kahwa's leaf extract which can be a healthy snack. Since the activity of antioxidant and polyphenols will provide good health effects for the body. Moreover, this will increase the utilization of kahwa's leaf. The stages of this research start with making of kahwa leaf extract, making hard candy, chemical analysis (moisture content, ash content, antioxidant, and polyphenol). The results showed that the moisture content 1,54 % - 2,06 % and the ash content 0,06% - 0,41% and the content of antioxidants and polyphenols is 40,61%-78,52% dan 720 – 1423,33 mg GaE/gram. This results imply that kahwa's leaves hard have met Indonesian National Standard (SNI)..

Keywords: Kahwa's leaves, Hard candy, antioxidant, polyphenol

1. Introduction

The coffee leaves known as "kahwa leaves" were used as traditional drinks in Tanah datar Regency. This traditional beverage known as "aia kahwa". The appearance of this beverage looks similar with tea but has different flavor. Aia Kawa is much preferred by the rural population. The recipe were derived from the descendants of their respective (Based on Community survey results in the Sungai Tarab District of Tanah Datar).

Previous research related to kahwa's leaves still scarce in number. One of the research including the making of tea leaves kahwa-cassiavera by Anggia (2011). The Hard candy product from Kahwa's leave extract is expected to develop product from kahwa leaf and food diversification. Candies derived from Kahwa leaf extract can be used as a healthy snack that provides a good effect for health with the presence of antioxidant activity in snacks. Some of the advantages of hard candy production from Kahwa leaf are, for example, the unnecessary addition of the dye due to the extract from the leaf kahwa has an attractive and quite strong brown color. In addition, the candy products from kahwa leaf extract have a distinctive flavor and aroma so there is no need for additional flavor.

"Aia Kahwa", a traditional drink made by boiling kahwa leaves, is usually treated in a certain way before the boiling process is done. Some treatments such as drying the leaves under the sun, warming over the embers until a fragrant aroma occurs. "Aia Kahwa" have a bitter taste, fresh and delicious, and has a distinctive aroma. Fragrant aroma is caused by changes in the content of coffee leaves due to heat treatment such as changes in carbohydrates, amino acids, essential oils, tannins and kaffeine (Baikal, 2007).

Candies are processed food products that are solid, made from sugar or sugar mixtures with other sweeteners with or without the addition of other food stuffs and food additives that are permitted, and has a hard structure (National Standard of Indonesia, 2008). The temperature used to make the candy so that the moisture content reaches about 3% is 150^{o}C. The technique of making candy with satisfactory durability lies in the production process with minimum moisture content and with very little tendency to crystallize (Buckle et al., 1987). The results of study by Srimarlinda (2010) showed that more higher temperature used for making hard candy, the hardness will higher and lower moisture content

2. Method

2.1. Raw Material Selection

The main raw materials used are kahwa's leaves obtained from farmers' gardens in Nagari Pasie Laweh, Sungai Tarab, Tanah Datar, West Sumatra. Kahwa leaves are then sorted according to requirements.

2.2. Extracting Process

After finished in sorting, then kahwa leaves roasted until the fragrant aroma occurs and the color of the leaves turns to dark brown. The roasted leaves are then extracted. The comparison of kahwa leaf extraction was used with a ratio of 1:10 with water.

2.3 Inverted Sugar Making

The process in making inverted sugar following Wahyuni (1998) as follows: 200 grams of sucrose dissolved in 90 ml of water and added 1% citric acid concentration (2 grams) then heated to 100 ° C for 20 minutes. Then controlled pH with 33.3% NaOH until it reaches pH 5. this process will produce 200 ml of inverted sugar.

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2.3. Hard Candy Production

The process of making this hard candy is guided by the way of Srimarlinda (2010), with the following work order: First, 200 grams of sugar (sucrose) plus 20 ml of water. Second, apply kahwa leaf extraction (according to treatment) and then add 50 ml of inverted sugar while heated until the final heating temperature reaches 150^0C (note, if put into water, the extract will be in the form of yarn sheet and can be broken). Third, after heating and then cooled to 60 °C. Then, add the leaf syrup of kahwa according to the treatment. After that, put in mold to harden. Remove the hard candy from the mold when it is completely hardened.

2.4. Research sites

This research was conducted in Laboratory of Agricultural Industrial Technology, Dharma Andalas University and Laboratory of Agricultural Technology Production, Andalas University.

2.5. Research design

The design used was Completely Randomized Design (RAL) with 5 treatments and 2 replications. If there were significantly different at the 5% level, a follow-up test will be perform using Duncan's New Multiple Range Test at 5% level.

For Treatment: A: Add 20 ml kahwa leaf extract, B: Add 30 ml kahwa leaf extract, C: Add 40 ml kahwa leaf extract, D: Add 50 ml kahwa leaf extract, E: Add 60ml Kahwa leaf extract

2.6. Observation

Observations made were: moisture content, ash content, antioxidants and polyphenols.

3. Results and Discussion

3.1. Moisture Content

Moisture content analysis results obtained from the hard candy leaves of kahwa can be seen in Figure 1

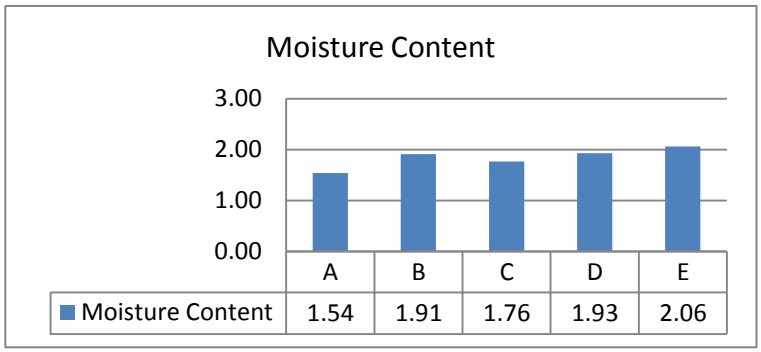

Fig 1. Moisture content of Kahwa Leaf Hard candy

The results of laboratory analysis showed that the average water content of hard kahwa leaves ranged from 1.54 - 2.06%. moisture content is very influential on the quality of hard candy, because the quality of hard candy associated with water content. Based on SNI 3547.1: 2008, maximum moisture content of hard candy, is 3.5%. based on this standard, the moisture content of hard candy kahwa meets the quality requirements. Based on the results of analysis of variance, the addition of leaf kahwa extract not give a real effect on the hard candy water content produced.

Table 1. Duncans New Multiple Range Test at 5% level

Perlakuan	%
A. Adding 20ml kahwa leaf extract)	1,54 a
B. Adding 30ml kahwa leaf extract)	1,91 a
C. Adding 40ml kahwa leaf extract)	1,76 a
D. Adding 50ml kahwa leaf extract)	1,93 a
E. Adding 60ml kahwa leaf extract)	2,06 a

3.2. Ash Content

Ash content is very useful as a parameter of nutritional value of foodstuffs because it is a test to determine mineral materials (inorganic) (Sudarmadji, et.all, 1989). The higher levels of minerals contained in a foodstuff can cause damage to the intestines and human digestive disorders. The results of Ash Content obtained from hard candy leaves of kahwa can be seen in Figure 2

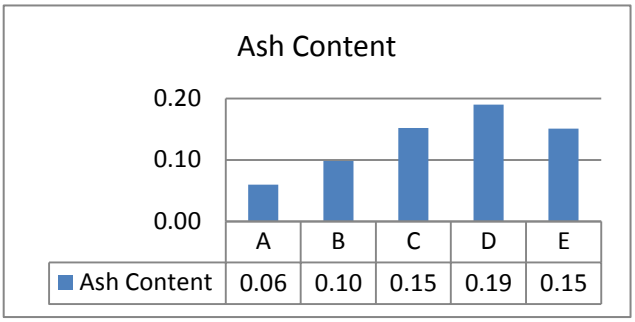

Fig 2. Ash content of Kahwa Leaf Hard candy

Based on the results obtained that the ash content obtained from hard candy leaves kahwa 0.06% -0.19% Compared with the quality requirements of ash content of SNI 3547.1: 2008 of hard candy is maximum 2.0%, then ash content from hard candy kahwa leaves qualify. This indicates that the raw materials of inverted and sucrose sugar used in making hard candy leaves of kahwa, have sufficient ash content for the requirements of making hard candy so that the resulting ash content meets the quality requirements.

The result of Analysis of variance showed that the addition of kahwa leaf extract did not give significant effect to hard candy ash content.

Table 2. Duncans New Multiple Range Test at 5% level

Perlakuan	%
A. Adding 20ml kahwa leaf extract)	0,06 a
B. Adding 30ml kahwa leaf extract)	0,10 a
C. Adding 40ml kahwa leaf extract)	0,15 a
D. Adding 50ml kahwa leaf extract)	0,19 a
E. Adding 60ml kahwa leaf extract)	0,15 a

3.3. Antioxidant Levels

The Results of antioxidant levels obtained from the kahwa leaf hard candy can be seen in Figure 3.

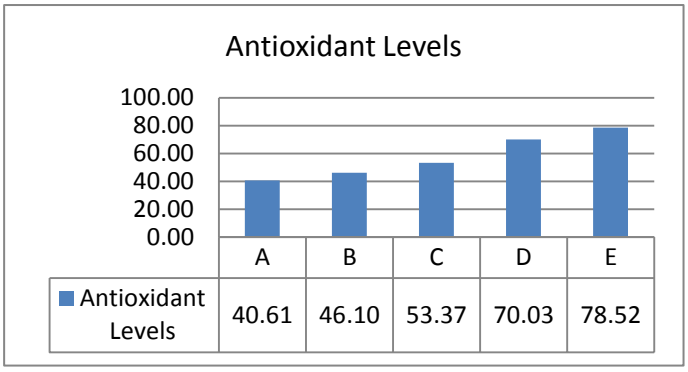

Fig 3. Antioxidant Level of Kahwa Leaf Hard candy

Based on the results of the study found that antioxidant data on hard candy from kahwa leaves was 40.61 - 78.52%. From these results it can be said that the leaves of kahwa have the potential to inhibit the free radical of DPPH. The ability of these antioxidants is also related to the chemical compounds found in the leaves of kahwa. Based on research by Anggia (2011) the tannin level on the leaves of kahwa is 6.4%. The tannins in the leaves of kahwa may be antioxidants, but there is also the possibility of other components that are antioxidants. Tanin is a secondary metabolite compound that is known to have several properties such as astringent, antidiare, antibacterial and antioxidant (Desmiati, et al 2008 in Malanggia, et al 2012). Also expressed by Hagerman (2002) that tannin serves as a biological antioxidant.

Table 3. Duncans New Multiple Range Test at 5% level

Perlakuan	%
A. Adding 20ml kahwa leaf extract)	40.61 a
B. Adding 30ml kahwa leaf extract)	46.10 ab
C. Adding 40ml kahwa leaf extract)	53.37 ab
D. Adding 50ml kahwa leaf extract)	70.03 bc
E. Adding 60ml kahwa leaf extract)	78.52 c

3.4. Polyphenol Levels

The content of Polyphenols in each extract is expressed as the equivalent of gallic acid or Gallic Acid Equivalent (GAE). GAE is a common standard for measuring the amount of phenolic compounds present in a material (Mongkolsilp et al., 2004). Based on the results of the research, it is known that the content of polyphenols in hard candy from kahwa leaves is 720 - 1423.33 mg GaE /gram

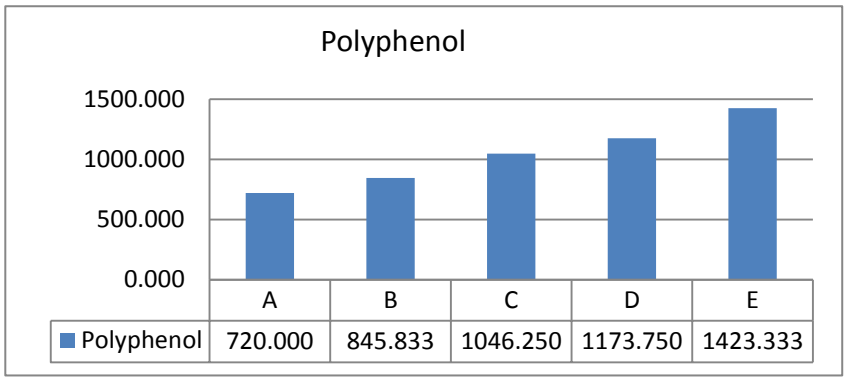

Fig 4. Polyphenol Levels of Kahwa Leaf Hard candy

The results of the analysis of variance at 5% level showed that, the addition of kahwa leaf extract gave no significant effect to the antioxidant on hard candy

Table 4. Duncans New Multiple Range Test at 5% level

Perlakuan	Mg GaE/ gram
A. Adding 20ml kahwa leaf extract)	725.833 a
B. Adding 30ml kahwa leaf extract)	853.889 a
C. Adding 40ml kahwa leaf extract)	955.278 a
D. Adding 50ml kahwa leaf extract)	1205.833 a
E. Adding 60ml kahwa leaf extract)	1409.722 a

One chemical component belonging to polyphenols in the leaves of kahwa is tannins. Tanin is a chemical compound belonging to a polyphenolic compound (Deaville et al., 2010). Dianawaty and Ruslin (2015) added that the classification of phenol compounds contained in plants is simple phenol, benzoquinone, phenolic acids, acetophenone, naphthoquinone, xanton, bioflavonoid coumarin, stilben, tyrosine derivatives, hydroxy cinnamic acid, flavonoids, lignans and tannins

4. Conclusion

A brief summary should be given for the principal conclusions of the work. Hard candies from kahwa leaves that are studied show good quality because they have fulfilled SNI 3547.1: 2008 seen from the content of moisture content, ash content. Antioxidant data on hard candy from kahwa leaf is 40,61 - 78,52% while polyphenol content in hard candy from kahwa leaf is 720 - 1423,33 mg GaE / gram. From these results can be said that hard candy produced is a hard candy that gives good health effects because it contains antioxidants and polyphenols, because kahwa leaves have the potential to inhibit the free radical DPPH. The ability of antioxidants is also related to the chemical compounds found in the leaves of kahwa is tannin which is classified as polyphenols. Further research is needed such as hardness level testing on hard candy and testing with appropriate temperature and time variations to obtain better hard candy texture.

References

[1] J. Van der Geer, J.A.J. Hanraads, R.A. Lupton, The art of writing a scientific article, J. Sci. Commun. 163 (2000) 51–59.
[2] W. Strunk Jr., E.B. White, The Elements of Style, third ed., Macmillan, New York, 1979.
[3] G.R. Mettam, L.B. Adams, How to prepare an electronic version of your article, in: B.S. Jones, R.Z. Smith (Eds.), Introduction to the Electronic Age, E-Publishing Inc., New York, 1999, pp. 281–304.
[4] Anggia, Malse. 2011. Pengaruh penambahan cassia vera terhadap penerimaan dan daya antioksidan minuman celup (teh hitam, teh hijau, dan daun kahwa). Padang. Program Studi Teknologi Industri Pertanian. Pascasarjana UNAND
[5] Badan Standarisasi Nasional Indonesia. 2008. Kembang Gula. SNI 3547.1:2008. Jakarta
[6] Baikal, Dodis. 2007. *Pengaruh Perbedaan Cara Pengolahan Daun Kopi Terhadap Cita Rasa Dan Kandungan Bahan Utama Minuman Aia Kahwa*. Padang. Fakultas Pertanian Universitas Andalas
[7] Buckle, k. A., R. A. Edwards, G. H. Fleet, dan M. Wooton. 1987. *Ilmu Pangan*. Penerjemah; Purnomo, Hari dan Adiono. Jakarta. UI. Press. Terjemahan dari : *Food Science*. 365 hal.
[8] Deaville ER., Givens DI., & Muelle r-Harvey I. 2010. Chestnut and mimosa tannin silages:effects in sheep differ for apparent digestibility, nitrogen utilisation and losses. Anim feed Sci Technol. 157:129-138.

[9] Desmiati, Y., Ratih H., Dewi MA., Agustin R. 2008. Penentuan Jumlah Tanin Total Pada Daun Jati Belanda (*Guazuma Ulmifolia Lamk*) Dan Daun Sambang Darah (*Excoecaria Bicolor Hassk*), Secara Kolorimetri Dengan Pereaksi Biru Prusia. Ortocarpus, 8: 106-109

[10] Dianawaty dan Ruslin.2015 . Kandungan Total Polifenol dan Aktivitas Antioksidan dari Ekstrak Metanol Akar *Imperata cylindrica* (L) Beauv. (Alang-alang). pISSN: 0126-074X; eISSN: 2338-6223; http://dx.doi.org/10.15395/mkb.v47n1.398

[11] Hagerman, A. E. 2002 Tannin Handbook. Departemen of Chemistry and Biochemistry. Miami:miami university press.[12] Mongkolsilp, S., Pongbupakit, I., Sae-lee, N., Sitthithaworn, W. 2004. Radical Scavenging Activity and Total phenolic content of Medical plants used in primary health care. Jurnal of Pharmacy and Science. 9 (1) :32-35

[12] Srimalinda, Erliana. 2010. Pengaruh penambahan sirup rosella (*hibiscus sabdarifa* l.) Terhadap karakteristik dan sifat organoleptik *hard candy* yang dihasilkan. Padang. Fakultas Teknologi Pertanian Universitas Andalas.