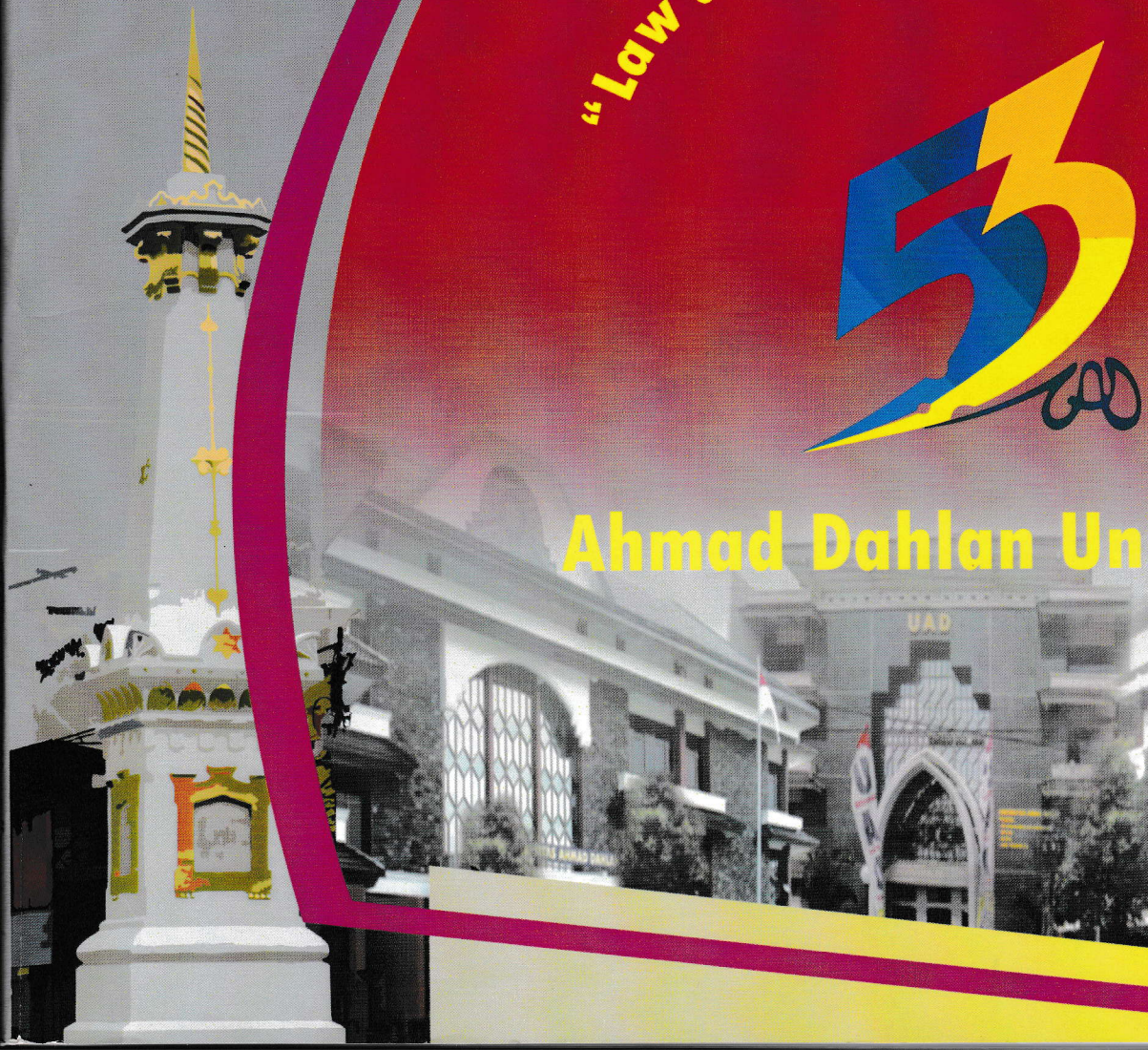
PROCEEDING

International Conference on Restorative Justice

4 January 2014, Grand Tjokro Hotel, Yogyakarta

"Consumer Protection Law and Pharmacy Perspectives"



Ahmad Dahlan University

PROCEEDING

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Theme :
Consumer Protection: "Law and Pharmacy Prespective"

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PHYSICAL PROPERTIES AND IRRITATION DEGREE OF GREEN TEA (*Camellia sinensis* L.) EXTRACT CREAM WITH VARIATIONS CONCENTRATION OF VITAMIN C AS ANTIOXIDANTS

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ABSTRACT

Epigallocatechin gallate (EGCG) is a polyphenol as the active compound that naturally found in many plants of tea (*Camellia sinensis*). That is effective as an anti-inflammation so it needs to be made into cream dosage form. One of the factors that must be considered in the development of a green tea extract cream formulations is physical properties of EGCG that is easily oxidate so it needs to be added antioxidant. One of the widely used antioxidant is vitamin C. The purpose of this study was to determine the effect of variations concentration of vitamin C as antioxidants toward the physical properties and irritation degree of green tea extract cream.

The cream used in the study contained 0.2% green tea extract and variations concentration of vitamin C as antioxidants at 1%, 5% and 10%. All of cream are evaluated toward physical properties and iritation degree on guinea pigs. The data of physical properties and irritation degree of creams are analyzed by parametric test of one way ANOVA with 90% of confidence level.

The results showed that increasing concentration of vitamin C will make decrease pH, spreading value and irritation degree but increasee the contact adhesion of cream.

The conclusion of this study indicate that 10% of vitamin C as antioxidant is the best concentration to obtain the best physical properties with minimum irritation degree of green tea extract cream.

Key word: green tea, cream, anti oxidant, irritation degree.

INTRODUCTION

Catechin is polyphenol in green tea which can use as an antioxidant. The kind of cathechin is epicatechin (EC), epicatechin gallate (ECG), epigallocatechin (EGC) and epigallocatechin gallate (EGCG). Catechin can reduce the activity of free radicals like radical DPPH, anion superoxid, free radical of lipid and radical of hidroxyl (Sang et al., 2003).

Based on the potential of catechin, the development of dosage form of catechin in cream is needed. On the other hand the problem to formulate EGCG (the main polyphenol of cathechin that can use as antioxidant) is the low of stability of EGCG because of the oxidation (Hsu, 2005). To prevent the oxidation of EGCG, the formulation of green tea cream has to contain the antioxidant. In this study the antioxidant vitamin C will be used to increase the stability of EGCG.

METHOD

Materials

This study used analithycal balance (AR2140 Ohaus, New York), waterbath (MEMMERT), pH meter, componen of cream with pharmaceutical grade (cethyl alcohol, stearyl alcohol, triethanolamin, glycerin, citric acid, methyl paraben, oleic acid (OA), tween 80, span 80, stearic acid, volatile oil of *Curcuma xanthorrhiza* (VO), propilen glycol (PG), vitamin C) and guinea pig (obtained from Yogyakarta).

Preparation of Cream

Formulation of cream in this study used the result of Sugihartini et all (2013) research. The formula consist of base cream, mixture of *enhancer* (OA, VO and PG), mixture of emulgator (Tween 80 and Span 80) and This study used two types of formula. Type 1 was formula as control that did not contain vitamin C and green tea extract (F1), formula as control that did not contain vitamin C and green tea extract formula with variation concentration of vitamin C: 1% (F3), 5% (F4), 10% (F5) and Formulation of cream of green tea extract with adding of antioxidant vitamin C was showed in table 1.

Firstly, stearic acid, cethyl alcohol, stearyl alcohol, citric acid, Span 80 and oleic acid were melted at 75^0 C and triethanolamin, gliceryn, methyl paraben and Tween 80 was melted too. After that the two components was mixed until homogeny. Finally, extract of green tea was added

Ingredient	F 1	F 2	F 3	F 4	F 5
Green tea extract	-	0.20	0.20	0.20	0.20
Stearic acid	5.14	5.14	5.14	5.14	5.14
Cethyl Alcohol	2.75	2.75	2.75	2.75	2.75
Stearyl alcohol	5.14	5.14	5.14	5.14	5.14
Triethanolamin	1.28	1.28	1.28	1.28	1.28
Glyserin	7.72	7.72	7.72	7.72	7.72
Citric acid	0.64	0.64	0.64	0.64	0.64
Methyl paraben	0.25	0.25	0.25	0.25	0.25
Oleic acid	6.04	6.04	6.04	6.04	6.04
Propylene glycol	7.17	7.17	7.17	7.17	7.17
Volatile oil of C. *xanthorrhiza*	6.79	6.79	6.79	9.79	9.79
Tween 80	10	10	10	10	10
Span 80	1	1	1	1	1
Vitamin C	-	-	1	5	10
Water	Ad 100	Ad 100	Ad 100	Ad 100	Ad100

Table I. Formulation of cream of green tea extract with variation concentration of antioxidant

Measurement of Physical Characteristic of Cream

1. pH measurement

The pH was measured in each cream formulation using pH meter.

2. Spread ability of cream

The 0.5 gram of cream was applied in between two glasses and was compressed to uniform thickness for 5 minutes. After that weight (50 gram) for 1 minute was added and the diameter of spreadable of cream was measured.

3. Adhesively of cream

The 0.5 gram of cream was applied in between two glass slides and was compressed to uniform thickness by placing 1 kg of weight for 5 minutes. After that weight (80 gram) was added and the time which upper glass moved over the lower plate was taken as measure of adhesively.

4. Irritation degree

The guinea pigs aged 2-3 months was used in this test. The hair of back of skin of guinea pigs was removed and then the cream was applied. After 24 and 72 hours the index of irritation on skin was measured based on the criteria of irritation in table Lu (1991).

RESULT AND DISCUSSION

1. pH Measurement

The result of pH measurement showed that the addition of vitamin C affected the pH of cream. The increasing concentration of vitamin C caused the pH of cream decrease because vitamin C has acid characteristic. The result of test was showed in table II.

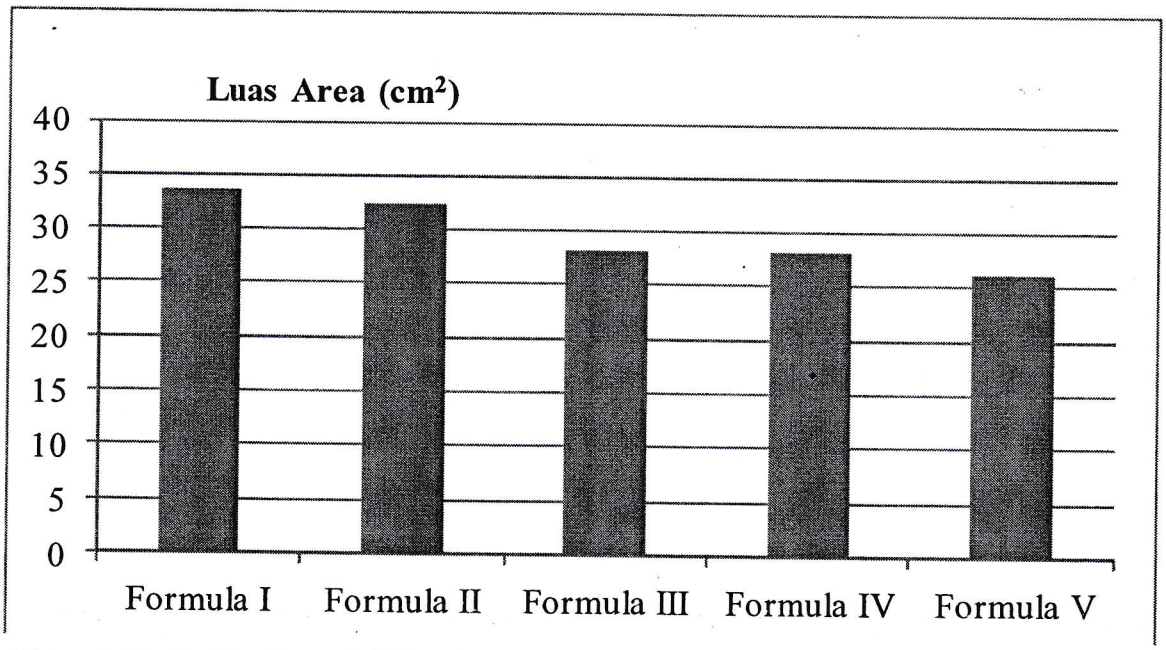
Table II. The result of pH measurement of cream of green tea extract with variation concentration of vitamin C

Formula	pH ± SD
Formula I	5.76 ± 0.05
Formula II	5.55 ± 0.04
Formula III	4.43 ± 0.10
Formula IV	3.53 ± 0.04
Formula V	3.09 ± 0.05

Statistical analysis showed that the data were normally distributed and homogeneous. Parametric analysis was performed using one-way ANOVA. From the results of the study showed that the addition of vitamin C will change the pH of the cream not significantly.

2. Spread ability of cream

Spread ability of cream was used to describe the capability of cream to spread on the skin. The result of test showed that the addition of vitamin C affected the spread ability of cream. The increasing concentration



Picture 1. The Profile of spread ability of green tea extract with variation concentration of vitamin C

of vitamin C caused the spread ability of cream decrease because the enhancement consistency of cream. The result of test was showed in picture I.

Formula	Irritation degree
Formula I	0.50
Formula II	0.50
Formula III	0.50
Formula IV	0.50
Formula V	0.50
Control	0.25

Statistical analysis showed that the data were normally distributed and not homogeneous. Parametric analysis was performed using one-way ANOVA. From the results of the study showed that the addition of vitamin C will change the spread ability of cream significantly.

3. Adhesivity of cream

Adhesively of cream was used to describe the capability of cream to adhesive on the skin. The result of test showed that the addition of vitamin C affected the adhesively of cream. The increasing concentration of vitamin C caused the adhesively of cream increase because the enhancement consistency of cream. The result of test was showed in picture II.

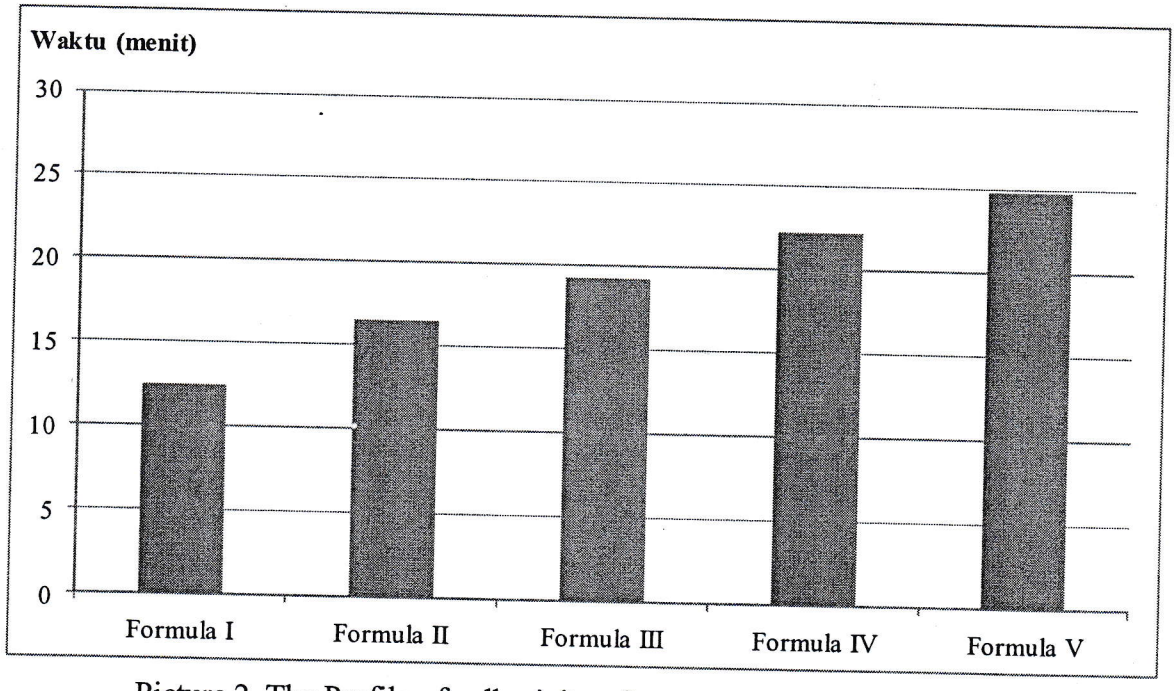
Statistical analysis showed that the data were normally distributed and not homogeneous. Parametric analysis was performed using one-way ANOVA. From the results of the study showed that the addition of vitamin C will change the adhesively of cream significantly between formula III, IV and V with formula 1 and not significantly with formula II.

4. Irritation degree

The irritation degree on the skin was measure based on the presence of the red spots on the back of skin of guinea pig. The result of test was showed in table III.

Table III. The result of irritation degree test of green tea extract with variation concentration of vitamin C

The result of study showed that formula I, II, III, IV, and V have 0.50 degree and control 0.25. This result indicated that the increasing concentration of vitamin C did not affect of irritation degree of cream on the skin. On the other hand the addition of vitamin C caused the cream more irritable because vitamin C has acid characteristic. Based on the result it can be concluded that



Picture 2. The Profile of adhesivity of green tea extract with variation concentration of vitamin C

addition of vitamin C caused the cream give low irritation.

CONCLUSION

The increasing concentration of vitamin C affected significantly to the spread ability and adhesively of cream but not significantly to pH and irritation degree to skin. The optimum concentration of vitamin C as antioxidant was 10 %.

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