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Research Article

The Test of Hair Tonic of Ethanol Extraction of Kepok Banana Peel (*Musa X Paradisiaca L.*) Activity as a Hair Growth Stimulant in Rabbits

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ABSTRACT

Hair growth stimulant supplies (hair tonics) were cosmetic supplies used to enhance hair growth or stimulate hair loss and baldness. The purpose of this study was to make a hair tonic formulation from the ethanol extract of Kepok banana peel and its effect on hair growth in order to the hair length and hair weight. Hair tonic was made with different concentrations of banana peel extract, in 1%, 2% and 4%. This test was applied to rabbit skin every day for 21 days and hair length was measured on day 8, 15 and 22 using calipers while hair weight was measured on day 22 by shaving the growing hair and then weighing it. The test results showed that the best formula which could increase hair growth was a formula containing 4% ethanol extract of banana peels. The hair growth enhancement activity in this formula was not significantly different from the positive control. Hair tonic supplies containing 1%, 2% and 4% of banana peel extracts showed good physical stability at low and room temperature storage.

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INTRODUCTION

The hair has an important role for humans. The role of hair for humans is to protect from the environment which can be harmful, such as hot or cold temperatures and UV rays. Hair tonics are preparations that contain ingredients needed by the scalp, hair roots and the hair (Tranggono and Latifah, 2007).

Kepok banana peel contains several nutrients, such as carbohydrates as the main energy

source, protein as an energy source, building blocks, regulatory substances as well as enzymes, fats and oils to maintain the health of the human body and a more effective source of energy than carbohydrates and proteins, as well as vitamins C which acts as a source of collagen synthesis, the formation of camitine, is involved in the metabolism of cholesterol into bile acids and plays a role in the formation of the nor epinephrine neurotransmitter. Vitamin C

also has antioxidant properties which are indispensable in the body, such as proteins, lipids, carbohydrates and nucleic acids from free radical damage (Pary, et al, 2016). This study aims to make hair tonic preparations containing ethanol extract of Kepok banana peel and determine the effect of its concentration on rabbit hair growth.

MATERIALS AND METHODS

Materials

The tools used in this study included a caliper to measure the length of rabbit fur, an analytical balance to weigh the mass of rabbit fur, scissors and a razor to shave rabbits, permanent marker to mark the rabbit's back between each treatment, erlenmeyer, measuring cup, stirring rods, pH meters, ovens, pycnometers, tweezers, coolers and glassware.

The materials used in this study were rabbit test animals, Kepok banana peel, 96% ethanol, propylene glycol, methyl paraben, propyl paraben, menthol, tween 80, aquadest and tissue.

Making the extraction

The test material used in this study was the Kepok banana peel which was obtained from the waste of fried food sellers. The Kepok banana peel that will be used is made simplicia by washing it as clean as possible, after that the air-dried process. After completing dry, then coarsely chopped. The Kepok banana peel simplicia was weighed, after that was macerated with 96% percent ethanol and then stored for 1 day. The maceration was filtered using a flannel cloth. The obtained maceration was stored (Filtrate A). The banana peel simplicia was weighed, after that it was macerated with 96% percent ethanol and then stored for 1 day while stirring frequently. The macerate was filtered again using a flannel cloth (Filtrate B). And so on until it is completely clean. Mix Filtrate A and Filtrate B until the last maceration process then concentrated with a Rotary Evaporator until the solvent evaporates completely and the extract becomes thick. The extract obtained is stored in a bottle.

Making the Hair Tonic

Weighing 0.01 grams of sodium metabisulfite, 2 grams of tween 80 and prepare aquadest.

Dissolving tween 80 in aquadest, stir until dissolved.

Weighing the thick extract of banana peel as much as 1, 2 and 4 grams.

Dissolving the extract in solution no. 2 until completely dissolved.

Dissolving sodium metabisulfite in distilled water until dissolved. Mix into solution no. 4 then stirring homogeneously.

Weighing 0.1 grams of menthol, 0.025 grams of nipasol, 0.25 grams of nipagin and 30 grams of ethanol.

Dissolving each of the menthol, nipagin, nipasol and ethanol until dissolved. Then mixed all four, mix homogeneously.

Weighing 15 grams of propylene glycol.

Adding propylene glycol to solution no. 7 little by little, then stirring homogeneously.

Adding solution no.5 to solution no. 9, little by little, then stirring homogeneously.

Making enough volume with aquadest. (Nusmara, 2012)

Evaluation of Preparation Materials

The evaluation of the preparation includes organoleptic observation, pH examination, determination of viscosity, measurement of specific gravity and stability test for 8 weeks (Ansel, 1989).

The Test of Hair Growth Activity

The test of hair growth activity on hair tonic preparations to rabbit hair used the modified Tanaka et al method in the journal Febriani, et al (2016). The hair on the rabbit's back is marked with a marker of 3 cm x 3 cm in 6 boxes, then cleaned by shaving completely with a razor. Then the back of the rabbit that has been cleaned is smeared with depilatory cream on the shaved area, therefore the fine hairs that are still left can be removed. After that, the back of the rabbit that has been shaved is going to be smeared with the test preparation for each test area.

The parts rabbit's bodies are smeared with the test preparation as:

The area 1 was not dripped with anything as a blank.

The area 2 was dripped with hair tonic which did not contain beneficial substances (negative control).

The area 3 was dripped with Natur hair tonic (positive control).

The area 4 was dripped with hair tonic with a concentration of 1% Kepok banana peel extract (Formula A).

The area 5 was dripped with hair tonic with a concentration of 2% Kepok banana peel extract (Formula B).

The area 6 was dripped with hair tonic with a concentration of 4% Kepok banana peel extract (Formula C).

The administration of hair tonic preparations with a volume of 1 mL for each part was carried out once a day. The first day of instillation was considered for the 1st day. The administration of hair tonic preparations was carried out for 21 days.

Analysis Data

The data analysis was performed on hair length and hair weight with ANOVA test.

Table 1: The Formulation of Hair Tonic

Materials	Negative Control	Formula A	Formula B	Formula C
Kepok Banana Peel Extraction	-	1 g	2 g	4 g
Etanol 96%	30 g	30 g	30 g	30 g
Propilen Glikol	15 g	15 g	15 g	15 g
Tween 80	2 g	2 g	2 g	2 g
Nipagin	0,25 g	0,25 g	0,25 g	0,25 g
Nipasol	0,025 g	0,025 g	0,025 g	0,025 g
Mentol	0,1 g	0,1 g	0,1 g	0,1 g
Na Metabisulfit	0,01 g	0,01 g	0,01 g	0,01 g
Aquadest	Ad 100 ml	Ad 100 ml	Ad 100 ml	Ad 100 ml

RESULTS AND DISCUSSION

The Result of Making Kepok Banana Peel Extraction

A total of 1000 grams of simplicia Kapok banana peel (*Musa x paradisiaca* L.) was macerated for 2 repetitions (2 days) then evaporated, obtaining a solid extract of 100 mL.

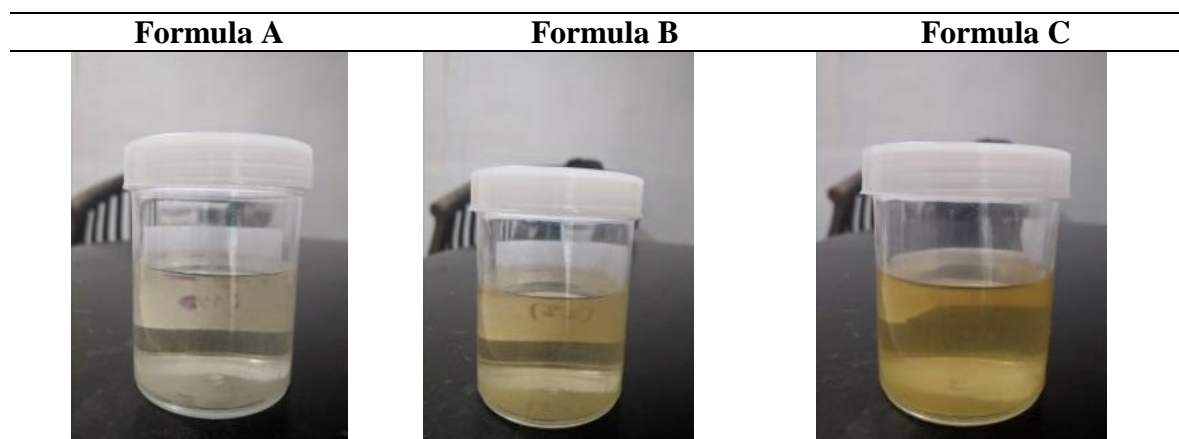


Fig.1: Artificial Hair Tonic

Observing the Organoleptic

The results of the initial evaluation on Formula A were transparent yellow color, menthol smell, homogeneous, pH 4.9, viscosity 0.02012 Poise and specific gravity 0.975 g/ml. Formula B has a slightly transparent yellow color, menthol smell, homogeneous, pH 5.5, viscosity 0.02076 Poise and specific gravity 0.969 g/ml. Formula C has a yellow color, menthol smell, homogeneous, pH 6.5, viscosity 0.02016 Poise and specific gravity 0.966 g/ml.

After stability tests were carried out in low temperature ($4\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$) and room temperature ($25\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$) for 8 weeks, organoleptic observations showed that formula A, Formula B and Formula C were stable at low temperature and room temperature.

Furthermore, the results of the pH test in Formula A, Formula B and Formula C increased at each storage temperature. This increase in pH did not make problem because it was still within the physiological pH of the skin, which was 4 - 7 (Anief, 2007), and still in a neutral pH vulnerable, namely pH 7. Changes in pH can be influenced by decomposition media such as storage temperature which can increase acid or alkaline levels (Putra, et al. 2014).

The viscosity of Formula A, Formula B and Formula C after being tested for stability at low temperature storage ($4\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$) and room temperature ($25\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$) decreased viscosity. Viscosity is inversely proportional to temperature. If the temperature increases, the viscosity will decrease and vice versa (Sani, 2010). Heating a liquid causes its molecules to gain energy. The fluid molecules are moving thus the interaction force will be weakened. Finally, the viscosity of the liquid will decrease with increasing temperature.

Specific gravity of Formula A, Formula B and Formula C at various low temperatures ($4\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$) and room temperature ($25\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$) can be seen in table 4.6. In Formula A, Formula B and

Formula C there is an insignificant increase in specific gravity. There are several factors that affect the specific gravity, which is temperature, where at high temperatures the compound whose density is measured can evaporate so that it can affect its specific gravity (Lachman, 1994).

The Test of Hair Growth Activity

The test of hair growth activity can be seen based on hair length and hair weight. In measuring the length of the rabbit's hair, the 10 longest hairs were taken and then measured using a caliper, while the hair weight measurement is carried out on the 22nd day by shaving all the hairs in the test area and then weighing.


The Test in the 8th Day

The negative Control is not significantly different from the blank but significantly different from Formula A, Formula B and Formula C. It is concluded there is no significant effect on hair growth in terms of hair length on the 8th day. Furthermore, there is no significant difference between Formula A against Formula B and Formula C, but Formula A on Positive Control has a significant difference, this indicates that Formula A has hair growth activity. This is presumably because each group of Rabbits requires adaptation to the formula; therefore it has not given optimal results.

The Test in the 15th Day

The Negative Control is not significantly different from Blank but significantly different from Formula A, Formula B and Formula C. It was concluded that there is no significant effect on hair growth in terms of hair length on the 15th day. Furthermore, Formula A towards Formula B, Formula C and Positive Control have no significant difference, and Positive Control also have no significant difference between Formula A, Formula B and Formula C. This indicates that all hair tonic formulas made have hair growth activity on the 15th day.

Table 2: Photos of Rabbit Hair Growth Results in Various Formulas

Days	Rabbit 1	Rabbit 2	Rabbit 3	Rabbit 4
0				
8				
15				
22				

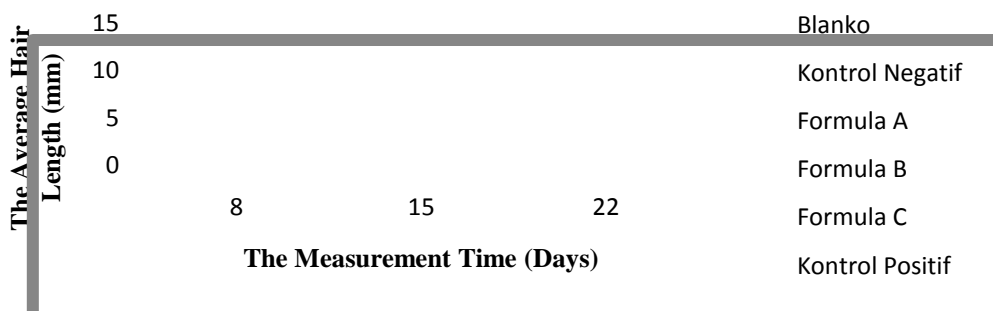


Fig.2: The Hair Growth Chart

The Test in the 22nd Day

The Negative Control is not significantly different from Blank but significantly different from Formula A, Formula B and Formula C. It is concluded that there is no significant effect on hair growth in terms of hair length on the 22nd day. Furthermore, Formula A towards Formula B do not have a significant difference while

Formula A towards Formula C have a significant difference, this is presumably due to the difference in the concentration of the active substances in Formula A and Formula B compared to Formula C, unlike Formula C which is not significantly different from that of Formula A. Positive Control is evaluated from the hair length.

Table 3: The Results of Measuring Average Hair Length

Treatment	The Average Hair Length (mm) ± SD		
	In the 8 th Day	In the 15 th day	In the 22 nd
Blanko	3.4425 ± 0.7827	5.6375 ± 0.5979	8.6750 ± 0.6323
Negative Control	3.7075 ± 0.0665	5.6650 ± 0.4318	8.5650 ± 0.5550
Formula A (1%)	4.8800 ± 0.9521	7.9750 ± 1.4120	10.7750 ± 1.4081
Formula B (2%)	5.3375 ± 0.8504	8.5275 ± 1.7433	11.3875 ± 1.6674
Formula C (4%)	5.4850 ± 0.2236	8.7075 ± 0.5784	12.6575 ± 0.5292
Positive Control	5.9425 ± 0.7417	8.8125 ± 0.5293	12.6500 ± 0.6477

Furthermore, the one way ANOVA test is also carried out on the hair weight data to determine whether there is a significant difference, then the BNT test was carried out to determine the difference in hair weight between treatments. The results of the one way ANOVA test on hair weight can be concluded that there is a significant difference in hair weight between treatments, to find out where the difference is, the BNT test is carried out. It can be seen that

the Negative Control was not significantly different from Blank, Formula A, and Formula B, in terms of hair weight, but significantly different from Formula C and Positive Control. Formula C itself was not significantly different from the Positive Control; this indicates that Formula C has better hair growth activity than Formula A and Formula B, in terms of hair weight on 22nd day.

Tabel 4: Hasil Pengukuran Rata-rata Bobot Rambut

The Treatment Group	The Average Hair Weight (mg) ± SD
Blanko	25.875 ± 3.9676
Negative Control	27.175 ± 3.8143
Formula A (1%)	32.275 ± 4.0086
Formula B (2%)	33.075 ± 5.5775
Formula C (4%)	39.500 ± 4.9416
Positive Control	40.675 ± 6.3814

CONCLUSION

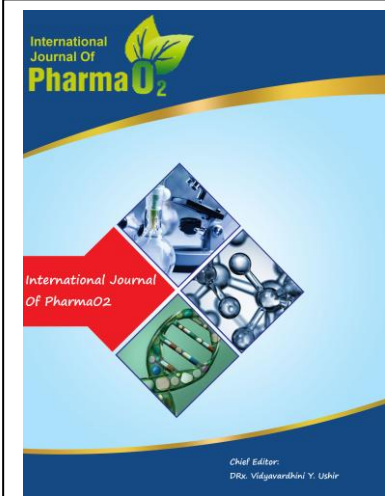
The ability of Kepok banana peel ethanol extraction in increasing hair growth activity is able to be due to the presence of alkaloids, flavonoid and tannins. Alkaloids which are secondary metabolites can increase the hair growth because the supply of food substances increases to nourish hair. The flavonoid compounds as a group of phenolic compounds are abundant in plant tissue which can act as antioxidants. The free radicals are one of the causes of hair loss, therefore, flavonoids can

prevent these free radicals and accelerate hair growth. The tannin compounds are thought to also play a role as hair nutrition in carrying out various biological activities. Tannin has function to the biological system because it is able to precipitate potential iron, organize protein and biological antioxidant.

From the compound which having an effect in increasing the hair growth activity, therefore it can be concluded that the hair tonic of the ethanol extract of the Kepok banana peel is a hair tonic group containing a hair conditioner.

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