The effect of coffee residu extract on hair growth

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Abstract. This research has been conducted for 3 (three) months in April to June 2018. The research includes the maintenance of test animals and the manufacture of extracts that will be in the Basic Laboratory of Universitas Samudra. The method used in this study consisted of making coffee extracts, making combination of solvents and test activity of preparation. Hair length data and hair weight obtained were then processed statistically to see if there was a significant difference between the test area and the treatments. Normal and homogeneous data distribution is processed for the analysis of variance (ANOVA). The results showed that treatment 3 (0.113 cm day⁻¹) on day 21 was faster than positive treatment (0.101 cm day⁻¹), negative treatment (0.060 cm day⁻¹), 4 treatment (0.099 cm day⁻¹) and 5 (0.090 cm day⁻¹) treatment. From the measurement of hair weight measured for 21 days showed treatment 3 resulted the largest hair weight of 0.207 g, followed by positive treatment 0.193 g, 4 treatment of 0.187 g, treatment 5 with 0.177 g and the lowest weight was in the treatment negative by 0.127 g.

1. Introduction

Hair loss is a process of hair loss in humans. Living in a tropical climate like Indonesia can make hair easily damaged by various factors such as high humidity, high intensity of sunlight and others. Ultraviolet (UV) rays that sting can cause hair loss and make hair pale [1] plus dust and pollution to make hair more easily limp and fragile. With such conditions, then people who live in the tropics do require hair care to avoid damage. Physiological conditions, emotional and physical stress, nutrition, hormonal and drug disturbances can affect hair growth that can stimulate the occurrence of hair disorders such as thin hair, fractures, reduced hair pigment, hair loss and even baldness [2].

Aceh is the largest coffee producing region in Indonesia. Coffee waste in the form of coffee residu is still thrown away, but one that is believed to be able to naturally fertilize hair is coffee residu because it contains caffeine. [3] say there is significant hair growth in caffeine concentration of 0.001% and 0.005% it can be concluded caffeine can stimulate hair growth. Furthermore (Bussoletti et al., 2010) also added a shampoo containing caffeine very well used for abnormal hair growth. Test results say shampoos containing caffeine can prevent a loss of 7.17% in 3 months and 13.45% within 6 months. According to [4] the beneficial effects of caffeine are inhibition of phosphodisesterase, follicle penetration and hair growth.

2. Materials and Methods

2.1 Materials
This research has been conducted for 3 (three) months in April until June 2018. The research includes the maintenance of test animals and the manufacture of extracts that will be in the Basic Laboratory of Universitas Samudra.

2.2 Methods

2.2.1 Making extract of coffee residu
Coffee residu are obtained through the filtering of coffee collected at a coffee shop in Langsa city. The coffee Residus to be used is first dried in the sun indirectly (covered by a black cloth). After being completely dry, then powdered, and each residu is extracted. 200 g residu powder soaked in 1500 ml ethanol 70% then stored for 5 days while stirring frequently. Then filtered using a flannel cloth, the filtrate obtained is stored (Filtrat A). The rest of the precipitate was immersed in 500 ml of 70% ethanol for 1 day while frequently stirred and then filtered using a flannel cloth to obtain filtrate B and precipitate. The filtrate B is mixed with filtrate A and is allowed to stand overnight and concentrated by being heated over a pot of water boiled over the stove until the solvent evaporates completely until it is thick and the solvent evaporates completely. Each of the obtained extracts is stored in a bottle of extract [5]

2.2.2 Preparation of combination solutions
The preparation of the extract solution consisted of the following 5 treatments [6]
1) Positive treatment with 100% hair tonic addition
2) Negative treatment with ethanol 70% addition
3) Treatment 3 was prepared by dissolving 75% extract of coffee residus
4) Treatment 4 is made by dissolving 50% extract of coffee residus
5) Treatment 5 is made by dissolving 25% extracts coffee residus

2.2.3 Test of test supplies activity
Testing the activity of coffee residu on the growth of male rabbit hair backs are cleaned from the hair by shaved clean, divided into 5 parts of each rectangle 2 x 2.5 cm and the distance between regions 1 cm. After shaving and before applying, the split rabbits were smeared with 70% ethanol as an antiseptic [7] The parts of the area are
1) Area I smeared with 100% hair tonic addition
2) Area II smeared with ethanol 70% addition
3) Area III smeared with 75% extract of coffee residus
4) Area IV smeared with 50% extract of coffee residus
5) Area V smeared with with 25% extract of coffee residus
Each treatment was then repeated 5 replications (figure 1)

Figure 1. The hatching area on the rabbit's back
2.3 Data analysis

Hair fertility test activity includes acceleration of hair growth and hair weight. Hair growth rate is obtained from hair length. Hair length data and hair weight obtained were then processed statistically to see if there was a significant difference between the test area and the treatments. Normal and homogeneous data distribution is processed for the analysis of variance (ANOVA). The purpose of the ANOVA test was to determine whether there was a statistically significant difference from the treatment group as a whole. Furthermore, to see statistically significant differences between test groups, the smallest significant difference test [8].

3. Results and Discussion
3.1 Acceleration of Hair Growth

From the measurements of hair growth for 21 days can be seen in figure 2.

![Figure 2. Accelerated growth of rabbit hair given coffee residus extract](image_url)

Demonstrate the fastest growth of hair growth on negative treatment, positive treatment, treatment 3, treatment 4, treatment 5 all occurred on day 21 but the slowest hair growth acceleration on each treatment was on day 7 but did not show any significant difference with day 14. Hair acceleration in treated rabbits showed a difference, the acceleration of hair growth owned by treatment 3 (0.113 cm day\(^{-1}\)) on day 21 was faster than positive treatment (0.101), Negative Treatment (0.060 cm day\(^{-1}\)), treatment 4 (0.099 cm day\(^{-1}\)) and treatment 5 (0.090 cm day\(^{-1}\)). The rate of acceleration of hair growth between treatment 3 and positive treatment did not show significant difference but in treatment 3 rabbit hair growth was still faster than other treatment (Table 1). Test results say shampoos containing caffeine can prevent a loss of 7.17% in 3 months and 13.45% within 6 months. Caffeine is a precursor that can stimulate hair growth. Caffeine in concentrations of 0.001% and 0.0005% can induce suppression of hair growth [9].
Table 1. ANOVA test accelerated growth hair on day 21

|                | Sum of Squares | df | Mean Square | F   | Sig. |
|----------------|----------------|----|-------------|-----|------|
| Between Groups | .003           | 4  | .001        | 1.651 | .201 |
| Within Groups  | .009           | 20 | .000        |      |      |
| Total          | .012           | 24 |             |      |      |

Figure 2 shows the acceleration of growth each week on an increase in all treatments this is due to the effects of treatment treated by the hair. Treatment 3 had the fastest rate of hair growth compared with positive treatment, negative treatment, treatment 4 and treatment 5 which rose every week on acceleration. Based on the research of Amin et al., 2014 the best formula showing the activity toward the most perfect hair growth is formula 1 that is 2.5% concentration and better than minoxidil 2.5%

Table 2. DUNCAN test accelerated growth hair on day 21

| Treatment   | N  | Subset for alpha = 0.05 |
|-------------|----|------------------------|
|             |    |                        |
| Tukey HSD²  |    |                        |
| Positive    | 5  | .07840                 |
| Negative    | 5  | .08000                 |
| 3           | 5  | .08900                 |
| 4           | 5  | .09940                 |
| 5           | 5  | .10580                 |
| Sig.        |    | .266                   |
| Duncan³     |    |                        |
| Positive    | 5  | .07840                 |
| Negative    | 5  | .08000                 |
| 3           | 5  | .08900                 |
| 4           | 5  | .09940                 |
| 5           | 5  | .10580                 |
| Sig.        |    | .074                   |

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 5,000.

3.2 Hair Weight
From the measurement of hair weight measured for 21 days showed treatment 3 resulted the largest hair weight of 0.207 g, followed by positive treatment treatment 0.193 g, treatment 4 of 0.187 g, treatment 5 with 0.177 g and the lowest weight was in the treatment treatment negative by 0.127 g (figure 3).
Figure 3 show that all treatments of coffee Residus extract and, positive and negative treatments can increase the thickness of the hair, where treatment 3 results in greater hair weight than other treatments. Big hair weight represents the diameter/thickness of a large hair. From the picture also seen the negative treatment has the smallest hair weight, which is still below the third treatment of coffee extract and the positive treatment. Based on these data it can be seen that treatment 3 (extract 75% coffee Residus) is an optimal combination because it has the most severe hair weight (0.207 g) which produces the thickest hair on the 28 day.

4. Conclusion
The results showed that treatment 3 (0.113 cm day$^{-1}$) on day 21 was faster than positive treatment (0.101 cm day$^{-1}$), negative treatment (0.060 cm day$^{-1}$), treatment 4 (0.099 cm day$^{-1}$) and treatment 5 (0.090 cm day$^{-1}$). From the measurement of hair weight measured for 21 days showed treatment 3 resulted the largest hair weight of 0.207 g, followed by positive treatment treatment 0.193 g, treatment 4 of 0.187 g, treatment 5 with 0.177 g and the lowest weight was in the treatment treatment negative by 0.127 g.

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