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FORMULATION OF HAIR GEL FROM CELERY ETHANOL EXTRACT (APIUM GRAVEOLENS .L)

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Abstract:

Uncontrolled hair loss will cause baldness. Celery (Apium graveolens L.) contains compounds apiin, apigenin, mannitol, inositol, asparagine, glutamine, choline, linamarose potassium and sodium. Apigenin is the main chemical content in celery which is known to have activity as a vasodilator that can stimulate hair growth. The purpose of the study was to determine the hair gel formula that had the best characteristics. The concentration variations used were 5%, 7.5% and 10%. This study uses experimental research methods. The activity starts from the preparation of the ethanol extract of dried celery, gel formualtion, and then evaluation of the preparation. The evaluation of the preparations included organoleptic tests, homogeneity, spreadability, pH, irritation, freeze thraw and the preference of the preparations by the respondents. The results showed that Formulas 1 (5%) and 2 (7.5%) met the standard parameters of hair gel preparations, while formula 3 (10%) did not standardize the spreadability test. In the organoleptic test, it was seen that the higher the concentration of the extract used, the more concentrated the color of the preparation. However, the increase in extract concentration did not significantly affect the dispersion of the preparation. Based on the results obtained, it can be concluded that Formula 1 (5%) has the best hair gel preparation characteristics compared to other formulas.

Keywords: Hair Gel, Ethanol Extract, Apium graveolens L.).

1. Introduction

Hair is a part of the human body that functions to protect the head from the sun and as a heater. Thick, long, jet black, shiny, healthy hair is everyone's dream. Factors such as genetics, age, and other factors can damage hair, fall out, and eventually lead to baldness (Kuncari et al., 2015).

Hair loss is a serious problem that is often experienced by both men and women. Hair loss can be caused by both internal and external factors. Internal factors that can cause hair loss include genetic disorders, hormonal conditions, systemic diseases, nutritional status, and poisoning. While external factors include environmental stimuli, as well as the use of hair cosmetics that are not in accordance with the condition of the hair. These factors can cause abnormal hair cycles and shafts that damage hair follicles and cause hair growth disorders (Widodo & Victor Purba, 2020).

Various cosmetics have been developed to address the problem of baldness and hair loss, both derived from synthetic or natural ingredients (Kuncari et al., 2015). One of the pharmaceutical preparations that can be used to treat hair loss and baldness is in the form of a gel. Gel is the first choice because of its large water content, which makes the skin comfortable and cool, easy to apply, non-greasy, easy to clean, clearer, elegant, elastic, has high adhesion, and does not clog pores (Sri Kuncari & Praptiwi, 2014).

Celery (Apium graveolens L.) is included in the Apiaceae tribe which has been studied to stimulate hair growth. Celery contains the compounds apiin, apigenin, mannitol, inositol, asparagine, glutamine, choline, linamarosa potassium and sodium. Apigenin is the main chemical substance in celery and is known to have activity as a vasodilator which can stimulate hair growth (Sri Kuncari & Praptiwi, 2014). Celery also contains sodium, vitamins A and B, calcium, and iron which have the ability to nourish hair growth, blacken hair, and prevent hair loss (Hindun et al., 2019).

Based on research conducted by Subur Widodo and Swasono R. Tamat (2020) celery leaf extract has the potential to stimulate hair growth in rabbits. In addition, research conducted by Siti Hindun, Akmal Akmal, Aji Najihudin, and Nurmaya Sari (2017) also shows that celery has the ability to stimulate hair growth. In previous studies, it was found that the concentration of celery extract which is good for stimulating hair growth is 7.5%. So that in this study, the authors will increase the concentration of celery extract to 10% and reduce the concentration of celery extract to 5% (Widodo & Victor Purba, 2020). Based on the background above, the authors are interested in formulating Celery (Apium graveolens L.) into a hair gel preparation.

2. Materials and Methods

Tools And Materials

The tools used in this research are laboratory glassware, Universal pH Paper, Analytical Scales, Hot Plate, Rotary Evaporator, and Homoganizer.. The materials used were 70% ethanol, Carbopol 940 (alpha chemika®), Triethanolamine (merck KGaA®), Propylenglycol (pharmco-aaper®), Methyl Paraben (sparchem®), Sodium Metabisulfite (merck KgaA®), Herb Celery (Apium graveolens L.) and aquadest.

Making Celery Simplicia (Apium graveolens L.)

The first stage is plant determination. Next was the collection of samples of Celery (Apium graveolens L.) herbs. Celery herb samples were sorted wet, washed, and then dried by airing for 3-7 days. After the Celery herb samples are dry, do a dry sorting by separating foreign objects such as gravel, soil, or other impurities from the ingredients. Then, the dried sample was mashed using a blender until it became a fine and uniform powder. The result is put in a closed glass container.

Preparation of Celery Ethanol Extract (Apium graveolens L.)

The extraction process is carried out by maceration method. 2 kg of celery herb simplicia powder into the maceration container, then macerate with 70% ethanol solvent until submerged. The first maceration process was carried out for 3 days at room temperature with stirring every 24 hours. Then filtered using filter paper, so that the filtrate and residue are obtained. Then remaceration was carried out for 2 days for 2 repetitions. The filtrate obtained was then evaporated using a rotary evaporator to obtain dry extract.

Celery Ethanol Extract Hair Gel Preparation Formulation

Table 1. Formula of Hair Gel of Celery Ethanol Extract

Ingredient	Formula %(b/b)				Function
	F0	F1	F2	F3	
	Basis	5%	7,5%	10%	
Celery Ethanol Extract	0 g	5 g	7,5 g	10 g	Active substance
Carbopol 940	1 g	1 g	1 g	1 g	Gel Base
Triethanolamine	2 g	2 g	2 g	2 g	Emulsification
Propylene glycol	15 g	15 g	15 g	15 g	humectants
Methyl Paraben	0,1 g	0,1 g	0,1 g	0,1 g	Preservative
Sodium Metabisulfite	0,8 g	0,8 g	0,8 g	0,8 g	Antioxidant
Aquadest	ad 100 g	ad 100 g	ad 100 g	ad 100 g	Carrier

Procedure :

Prepare the tools and materials to be used

1 gram of carbopol 940 was developed in 40 mL of hot water, allowed to stand for 24 hours. (Mass 1)

Dissolve methyl paraben in hot water as much as 20 times the amount of methyl paraben. Dissolve sodium metabisulfite with water as much as 2 times the amount of sodium metabisulfite. Dissolve the ethanol extract of the celery with aquadest. Add Triethanolamine (TEA) to Mass 1 while homogenizing with a homogenizer until a gel base is formed. (Mass 2) Add the methyl paraben solution into Mass 2 while homogenizing it with a homogenizer (Mass 3). Then add propylene glycol to Mass 3 while homogenizing it with a homogenizer (Mass 4). Add sodium metabisulfite solution to Mass 4 while homogenizing with a homogenizer. After being homogeneous, add the celery ethanol extract that has been dissolved with aquadest, then add the remaining aquadest. After that all the ingredients were homogenized using a homogenizer with a speed of 1100 rpm and a stirring time of 15 minutes.

Evaluation Of Hair Gel

The evaluation tests of hair gel preparations include Organoleptic Test, Homogeneity Test, Spreadability Test, pH Test, Irritation Test, Freeze-thraw Test, Preference Test.

3. Results and Discussion

Organoleptic Test Results

Organoleptic test was carried out by observing the color, shape and smell of the preparation. The organoleptic test was carried out using the visual senses (Riyanta & Amananti, 2020). The organoleptic test of this hair gel preparation was carried out on the first day. From the results of the organoleptic test, there was a color difference between FI, FII and FIII (Table 2)

Table 2 Organoleptic Test Results For Hair Gel

Formula	Organoleptic		
	Colour	Scent	Form
F0	Clear	odorless	Gel
F1	Brownish Green	Celery Extract	Gel
F2	Dark Brownish Green	Celery Extract	Gel
F3	Dark green	Celery Extract	Gel

Based on the results of the organoleptic test, all formulas showed a gel form. Formula 0 without extract showed clear or transparent color, while FI, FII, and FIII with added extract showed green color. For odor, F0 indicates a characteristic odor of gel, while FI, FII, and FIII indicate a characteristic odor of celery extract. Organoleptic testing is very important in evaluating pharmaceutical preparations in order to produce the appropriate quality (Riyanta & Amananti, 2020).

Homogeneity Test Results

Homogeneity test of hair gel preparations was carried out on the first day. Homogeneity testing was carried out to determine the level of homogeneity in the hair gel preparations that had been made (Ibrahim & Hamidah, 2020). From the results of the homogeneity test it can be seen that FI, FII and FIII are homogeneous (Table 3)

Table 3 : Homogeneity Test Results

Formula	Homogenity Test
F0	Homogeneous
F1	Homogeneous
F2	Homogeneous
F3	Homogeneous

The homogeneity test functions to find out whether or not the hair gel preparations that have been made are distributed (Riyanta & Amananti, 2020). The tool used to homogenize the hair gel preparation is the homogenizer. Based on the homogeneity test results showed that Formula 0 (base), Formula I (extract concentration 5%), Formula II (extract concentration 7.5%), and Formula III (extract concentration 10%) were homogeneous. This is indicated by the absence of coarse particles or lumps which are prepared to be evenly mixed and evenly distributed. Gel preparations are said to be homogeneous if there is an even color equation (Riyanta & Amananti, 2020).

pH Test Results

The pH value is a characteristic that needs to be considered in a topical formulation. The pH test aims to determine whether the pH value of a preparation is acceptable to the skin (Novia Inda Kharisma et al., 2020) (Table 4)

Table 4: pHTest Results

Formula	pH Observation of Lotion Preparations		
	Day-1	Day-2	Day-3
F0	7	7	7

F1 (8%)	5	5	5
F2 (10%)	6	6	6
F3 (12%)	5	5	5

The pH test serves to determine the pH value of the hair gel preparation that has been made whether it is acceptable to the scalp or not (Novia Inda Kharisma et al., 2020). Triethanolamine is added to the formula for neutralizing carbophol which is acidic because it contains 56-86% carboxylic acid (Sulastri et al., 2016). If the pH of the hair gel preparation is too alkaline, it causes the scalp to become dry, while if the pH of the hair gel preparation is too acidic, it causes irritation to the scalp (Hindun et al., 2019)). Based on the pH test results, Formula 0 (base) has a pH of 7, Formula I (extract concentration 5%) has a pH of 5, Formula II (extract concentration of 7.5%) has a pH of 6 and Formula III (10% extract concentration) has a pH of 5 Based on the results above, it can be seen that each gel formulation made is relatively stable and meets the pH requirements used on the scalp, namely 3.0-7.0 according to SNI 16-4955-1998. So the pH test results of all gel preparations are safe to use (Auliasari et al., 2018).

Irritation Test Results

The irritation test serves to see whether or not irritation appears on the skin after the hair gel preparation is applied (Armadany et al., 2015). Based on the results of the irritation test above, in Formula 0 (base), Formula I (extract concentration 5%), Formula II (extract concentration 7.5%), and Formula III (10% extract concentration) there were no symptoms such as redness and itching. itchy skin. This is because the hair gel preparation has a pH that is not too acidic, if the pH of the hair gel preparation is too acidic it will cause irritation to the scalp (Hindun et al., 2019). This shows that there is no irritation so that the hair gel preparation is safe to use (Sulastri et al., 2016).

Freeze thaw test

Freeze Thaw Test serves to see the stability of hair gel preparations made at extreme temperature changes (Auliasari et al., 2018). Therefore, the freeze thaw test used a cold temperature of 40 and a high temperature of 400. A temperature of 40 was used because 40 is a cold temperature. 400 temperature is used because the temperature is 400 more than room temperature. The results of this test showed that Formula 0 (base), Formula I (extract concentration 5%), Formula II (extract concentration 7.5%), and Formula III (10% extract concentration) did not change. Based on the research of Nurul Auliasari, Akma Akmal, and Caca Efendi, hair gel preparations that did not change included a stable formula (Auliasari et al., 2018).

Preference Test Results

A preference test was carried out to determine the level of preference of respondents for the hair gel preparations made. The results of the color preference test show that as many as 10% of respondents like FI. The results of the preference test for odors showed that 15% of respondents liked FI. The results of the test of preference for dispersion showed as many as 20% of respondents liked FI. From the results of the preference test, the most preferred formula is FI. The preference test was carried out to determine the respondent's level of preference for the hair gel preparation made (Auliasari et al., 2018).

4. Conclusion

Based on the research that has been done, the results of organoleptic tests, homogeneity, spreadability, pH, irritation test, freeze thraw test and preference test. Formula I (extract concentration 5%) and Formula III (extract concentration 10%) are known to meet the characteristics of hair gel. Whereas Formula II (7.5% extract concentration) fulfilled the characteristics of hair gel except for the spreadability test. Formula I (extract concentration of 5%) is a formula that has the best characteristics.

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