THE EFFECT OF ROSEMARY *(Rosmarinus officinalis L.)* FORMULATION ON HAIR TONIC SPRAY ENRICHED WITH FLORAL FRAGRANCE

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Abstract

Hair is a unique derivative structure of the skin and is one of the characteristics that define the characteristics of humans. The usage of synthetic drugs or chemical compounds causes side effects such as hair becoming dry and cracked. Hence, people are turning to alternative methods of treatment using herbs. The use of a hair tonic can aim to stimulate hair growth, prevent hair loss, and eliminate dandruff. One of the herbal plants that is efficacious for hair growth is rosemary leaves (Rosmarinus officinalis L. Rosemary is known to stimulate hair growth. Rosemary extract contains saponins, flavonoids, glycosides, alkaloids, and tannins. One of the compounds that plays a role in hair growth found in the rosemary plant is saponin. Saponin is a compound that can stimulate hair growth. This research aimed to test the physical stability by BPOM standards containing rosemary extract with varying concentrations of 0.1%, 0.2% and 0.3%. Hair tonic has been chosen because it is in the form of a solution, easy to apply, not sticky like semisolid formulations, and does not leave a crust which causes dandruff. Hair tonic preparations are made from Peg 40, Glycerin, Nipaguard, Perfume, and water. Evaluation of preparations includes stability test, organoleptic test, homogeneity tests, pH tests, and specific gravity tests. The physical stability test of the preparation was carried out at high temperature, room temperature, and low temperature. The research results show that the physical stability test is stable at high temperature, room temperature, and low temperature. The results showed that there was a significant influence from the addition extract of rosemary oil on the physical properties of hair tonic including aroma, color, homogeneity, the impression of use, and panelist's preferences.

Keywords: Hair Tonic, Rosemary Oil, Stability Test, Organoleptic test, BPOM.

I. INTRODUCTION

Hair is a unique derivative structure of the skin and is one of the characteristics that define the characteristics of humans. Each hair experiences a growth process through a cycle consisting of anagen, catagen, and telogen phases, namely the growth, regression, and resting phases (1). In this era, various hair treatments are made to clean, color, straighten hair and nourish hair. Many hair treatments use and contain chemicals or heavy metals that cause damage to scalp tissue and hair tissue and can cause allergies or chronic poisoning. Hair care and cleansing includes shampoo, conditioner, cream, and hair tonic (10). Herbal medicines or herbal preparations are an alternative way to replace the use of synthetic drugs. One of herbal plant that is efficacious for hair growth is rosemary leaves *(Rosemarinus officinalis L.)* (5). Rosemary extract contains saponins, flavonoids, glycosides, alkaloids, and tannin compounds. One of the compounds that plays a role in hair growth in the rosemary plant is saponin (2). Saponin is a compound that can stimulate hair growth (6), whereas saponin can increase peripheral blood circulation (11). A hair

tonic is a product that used to strengthen hair roots, stimulate hair growth, remove dirt from the skin of the hair, and lubricate the hair (3). Hair tonic has been chosen because it is in the form of a solution, easy to apply, not sticky like semisolid formulations, and does not leave a crust which causes dandruff (7).

II. METHODOLOGY

The materials and tools used in this research are Rosemary Oil, floral perfume, Peg 40, Glycerin, Nipaguard, distilled water, glass bottes, measuring glass, pipettes, and stirrers. The hair tonic formulation used inthis study used several levels of treatment, labelled as formula I with a rosemary oil concentration of 0.1%, formula II with concentration of 0.2%, formula III with a concentration of 0.3%, and formula IV as a blank control without essential (rosemary) oil (16).

Making hair tonic made by weighing all the necessary ingredients, In the first mixture, extract rosemary oil is measured with different concentrations, see (Table 1). Then, Nipaguard, Glycerin, Perfume and PEG 40 are combined and dissolved into 100 mL water. Mark the label with A1, A2, A3 and A4 according to the different concentration formulas for the rosemary extract that will be made. The control variables in this study were the addition of 0.1% aromatic of fragrance oil to each sample, the rosemary oil used, and the equipment and process for making hair tonic for hair loss.

This research includes qualitative methodologies in a laboratory setting. Physical stability tests, organoleptic tests, homogeneity tests, and pH tests. The first research method is stability testing with the Cycling Test Method. The purpose is to determine the stability level of a product .The second method is the organoleptic test. This test is to see hair tonic based on appearance, smell, and variety. The third method is the homogeneity test. The purpose is to determine the readiness of the hair tonic to make it homogenous or not. The product will consider homogenous assuming that the particles of all the ingredients used are mixed uniformly in the setting of the hair tonic (8). The next method is a pH test which aims to determine the pH value, one of the equipment used is a pH meter (4). The last is the specific gravity test, this test aims to determine the purity of a preparation during the storage period. If the specific gravity is known, the purity value of a preparation can also be known, especially in solution form (9).

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III. RESULTS AND DISCUSSION

Based on research (12) on rosemary hair tonic preparations with variations of propylene glycol, in organoleptic test there were changes in shape, color, and odor in hair tonic preparations to indicate a decrease in quality or physical stability of hair tonic. Based on the organoleptic test result of the shape, color, and odor of the preparation before the cycling test, the dosage form remained liquid, the color did not change in the three replications, namely the color was light yellow. The odor produced from the three replications of hair tonic preparations also did not change, namely the smell was typical of rosemary.

Based on the homogeneity test result, all hair tonic preparations form before and after the cycling test were declared homogenous. This means that there is not a single particle left or ingredient that has not been dissolved in the hair tonic. This is in accordance with the requirements, where hair tonic preparations are said to be good if they are free of particles and homogeneous (14).

Formula I was obtained with an average pH value of 4.8 then there was a decrease until it reached a value of 4.0, the formula II preparation before the stability test obtained an average pH value of 5.4 then decreased to 3.9 after the preparation was tested for stability. Before the stability test, the Formula III preparation obtained an average pH value of 51, which then decreased to 3.9 after the stability test of the preparation. The decrease in pH of the three hair tonic formulations may be due to the influence of CO_2 which interacts with water, causing the pH to become acidic (12).

From the results of research that has been done, this occurs reduction in the value of the specific gravity of the preparation from the previous value of the specific gravity of the stock after the cycling test. The specific gravity before and after the cycling test was 0.917 g/mL; 0.910 g/mL to 0.900 g/mL;0.910 g/mL to 0.908 g/mL. This caused by the extreme temperature used in this stability test which causes the preparation to experience a reduction in specific gravity which is suspected to be a chemical reaction during the storage process after cycling test (7).

Meanwhile, according to research by Yuda, et al (2023) entitled "Dermal Irritation Test and Hair Growth Stimulating Activity of Herbal Hair Tonic" from Usada, Bali. The method was to divided the animals into 4 groups, namely negative controls given carrier fluid, positive controls given hair tonic on the market, and the treatment group was given hair tonic with 10% and 20% simplicial concentration. Hair length was measured on days 7 and 21 with treatment given daily topically on the shaved backs of mice. The irritation test was carried out at the 24^{th} and 48^{th} hours. The data obtained was tested statistically using the ANOVA test and continued with the Tukey test with a confidence level of 95%, showing that the hair tonic formula contained alkaloids, flavonoids, saponins, tannins, and triterpenoids. The irritation test carried out did not show any irritation to the mice's skin. The hair growth activity test of the herbal hair tonic formula combining *Polycias Scutellaria* leaf, *Hibiscus Tiliaceus* leaf, *Trigonella Foenum Graecum* seeds and *Cananga Odorota* flowers showed significantly faster hair growth than the negative control at both concentrations and was not significantly different from the positive control. This hair tonic formula has the potential to develop into a natural hair growth agent without irritation to the skin (5).

In another study (6) entitled "The Effect of Adding Mangkokan Leaf Extract *(Nothopanax Scutellarium Merr.)* on the physical Properties and Shelf Life of Hair Tonic for Hair Loss. Researchers made Hair Tonic from Mangkokan Leaf extract as one of the hair tonic innovations that use mangkokan leaf extract as an active ingredient. The research method used is experimental research wth the independent variable being the amount of mangkokan leaf extract added, labelled as: X1 (2.5%), X2 (5%),X3 (7.5%). The dependent variable is the physical properties of hair tonic for hair loss which include aroma, color, homogeneity, impression of use, and panelist's level of preference. Meanwhile, the control variable is 0.5% tuberose flower aromatic oil in each sample. The type of leaf used is old mangkokan leaf. Data collection was carried out using the observation method by 30 panelists. Data analysis in this study used single SPSS, ANOVA and Duncan's Test. The results showed that there was a significant influence from the addition of mangkokan leaf extract on the physical properties of hair tonic including aroma, color, homogeneity, the impression of use, and panelist's preference.

The best hair tonic results were found in the addition of 2.5% mangkokan leaf extract (X1) with the criteria of not having a mangkokan leaf scent, being greenish yellow, homogenous, feeling cool and easily absorbed when applied to the skin surface, and was most liked by the panelist. The pH of hair tonic has an average of 5.59, which means it is neutral so it matches the skin's pH. The shelf life of X1 can be used until the 7^{th} day because the number of fungi (1.5×10^1) and bacteria (7.7×10^4) is still below the SNI maximum microbial limit for hair tonic, namely 10^5 (6).

Sona's research examined the physical stability and hair growth activity of hair tonic preparations containing aloe vera extract with varying concentration of 5%,7.5%, 10% and 15% which were made with additional ingredients of 96% ethanol, propylene glycol, propylparaben, methylparaben, sodium metabisulfite, and methanol. The physical stability test was carried out at high temperature, room temperature, and low temperature, while the hair tonic activity test was carried out by applying it to the back of mice that had been shaved and hair length was measured on the 3^{rd} day, 6^{th} day, and 9^{th} day. 12^{th},15^{th} and 18^{th} day. The research results show that the physical stability test is stable at high temperatures, room temperature and low temperatures. Meanwhile, the formula that provides potential results for rat hair growth is a hair tonic with an extract content of 10% and 15% (4).

IV. CONCLUSIONS AND NEWNESS

From the research results that have been discussed, it can be concluded that:

1. Hair tonic preparations from Rosemary leaf extract *(Rosemarinus officinalis L.)* have met the requirements in accordance with the standards set by BPOM, both n terms of organoleptics, homogeneity, pH, stability and specific gravity.
2. The formulation of Rosemary Extract with different concentrations of 0.1%, 0.2% and 0,3% produce a good stability.

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TABLES AND FIGURES

Table 1 Formulation of Hair Tonic

Sample	Concentration (%)	Extract Rosemary Oil (%)	Peg 40 (%)	Perfume (%)	Glycerin (%)	Nipaguard (%)	Water
A1	0.1	0.1	0.2	0.1	2	0.7	96.9 g
A2	0.2	0.2	0.4	0.1	2	0.7	96.6 g
A3	0.3	0.3	0.6	0.1	2	0.7	96.3 g
A4*	0	0 g	0.1	0.1	2	0.7	97.1g

*Control sample is added 0% rosemary extract oil
(20) Source: Wilyananda, 2022, Formulations are modified.