



UTILIZATION OF AVOCADO SEED EXTRACT AS AN ACTIVE INGREDIENT IN HAIR TONIC PREPARATION FOR HAIR LOSS

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Abstract

This research investigated the potential of avocado seed extract in creating hair tonic preparations to prevent hair loss. Avocado seeds are rich in beneficial compounds like tannins, flavonoids, terpenoids, saponins, and alkaloids, but public awareness of their use is limited. The research used a quantitative approach with an experimental design, testing avocado seed extract through pH, organoleptic, and hedonic tests. The independent variable was the avocado seed, while the dependent variables included pH levels, organoleptic properties (color, aroma), and panelist preferences. Data were collected using observation, surveys, and questionnaires. Data was analyzed using normality, homogeneity, and ANOVA tests. The results showed that the hair tonic preparations have normal pH values across all formulas, with formula F3 performing best in color (85.7% yellowish-orange) and aroma (57.1% characteristic avocado scent). The panelists also favored formula F3 with a preference score of 71.4%. Significant differences were observed in the preparations, highlighting the potential of avocado seed extract in cosmetic formulations. In conclusion, formula F3, containing 1.5% active avocado seed extract, was the best, with its optimal color, aroma, and normal pH influencing panelist preferences. This research demonstrates that avocado seed extract can be a promising active ingredient for hair tonic formulations.

Keywords: avocado seed extract, hair tonic, hair loss

INTRODUCTION

Beautiful hair is often considered a source of confidence, and it plays a significant role in one's appearance. Many individuals desire healthy and vibrant hair, leading them to seek various hair care solutions. However, despite the widespread use of hair care products, many people remain unaware of the potential benefits of natural ingredients in promoting healthy hair growth and reducing hair loss. The beauty and health of hair are influenced by several factors, including genetics, diet, and environmental conditions, with hair loss being a common concern among individuals of all ages (Safitri et al., 2023).

Factors such as hormonal imbalances, poor nutrition, stress, and harmful chemicals in hair care products can all contribute to hair thinning and shedding. While conventional hair care products, including shampoos and

conditioners, are widely used, there is growing interest in exploring the effectiveness of natural ingredients in preventing hair loss. Among the various natural alternatives, avocado is a popular fruit known for its nutritional and cosmetic benefits.

Although the flesh of the avocado is commonly used in skin and hair treatments, the seed is often discarded, despite containing valuable bioactive compounds such as flavonoids, saponins, tannins, and alkaloids (Praharyawan, 2012; Sarinastiti, 2018). These compounds have been shown to possess antioxidant, anti-inflammatory, and antimicrobial properties, making them potentially beneficial for hair health (Leite et al., 2009; Oboh et al., 2016).

Previous studies have explored the use of plant-based extracts in hair care formulations, but there is limited research focusing on the

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utilization of avocado seed extract as an active ingredient in hair tonics specifically designed to address hair loss. The majority of existing research has concentrated on the benefits of avocado flesh or other plant extracts, such as hibiscus and patchouli, for hair growth and health (Febriani et al., 2016; Ramadhanti et al., 2021). This study differentiates itself by specifically investigating the potential of avocado seed extract in creating a hair tonic formulation to prevent hair loss, providing a new avenue for natural hair care solutions.

Based on the problems that have been described, this research aimed to evaluate the effectiveness of avocado seed extract in hair tonic preparations, focusing on sensory qualities, such as color and aroma, as well as panelist preferences.

METHOD

This research used a quantitative method with an experimental research design. In this research, there were two variables: the independent variable (x) was the avocado seed and the dependent variables (y) were pH, organoleptic, and hedonic tests. The object of the research was the avocado seed, specifically its extract to be used as a hair tonic preparation. Data were collected through observation, documentation, and questionnaires.

Observations focused on the process of preparing the hair tonic, including changes in color and aroma during the mixing stages from 7 panelists. Documentation included written descriptions and photographs of each stage of preparation, the tools and materials used, and the final product. Questionnaires were designed using a Likert scale to evaluate panelists' perceptions of the hair tonic, including indicators such as color, aroma, and overall comfort during application.

The data were analyzed using normality, homogeneity, and ANOVA tests. The normality test used the Kolmogorov-Smirnov method to determine if the data were normally distributed ($p > 0.01$). A homogeneity test was conducted using Levene's test to ensure variances were equal across groups ($p > 0.01$). ANOVA test was applied to compare the effectiveness of the three formulations (F1: 0.5%, F2: 1%, and F3: 1.5% avocado seed extract), with a significance level of $p < 0.05$ indicating meaningful differences.

RESULTS AND DISCUSSION

Results

Frequency distribution of organoleptic test (color and aroma)

The frequency distribution of the organoleptic test results for color in F1 showed that 42.9% of panelists stated that the hair tonic had a less pronounced yellowish-orange color typical of avocado seeds. Meanwhile, 57.1% of panelists indicated that the hair tonic exhibited the characteristic yellowish-orange color of avocado seeds. For F2, the frequency distribution indicated that 28.6% of panelists reported that the hair tonic had a less pronounced yellowish-orange color, 42.9% stated it had the characteristic yellowish-orange color, and 28.6% indicated that the hair tonic was very much yellowish-orange. In F3, the frequency distribution showed that 14.3% of panelists reported that the hair tonic had the characteristic yellowish-orange color, while 85.7% stated that it was very much yellowish-orange.

Regarding the frequency distribution of the aroma in F1, 14.3% of panelists reported that the hair tonic preparation did not have the characteristic aroma of avocado seeds, 28.6% stated it had a less pronounced aroma, 28.6% reported it had the characteristic aroma, and 28.6% indicated it had a very strong aroma of avocado seeds. In the frequency distribution for the aroma in F2, 28.6% of panelists reported that the hair tonic preparation had a less pronounced aroma of avocado seeds, 42.9% indicated it had the characteristic aroma, and 28.6% stated it had a very strong aroma of avocado seeds. For F3, the frequency distribution showed that 42.9% of panelists reported that the hair tonic preparation had the characteristic aroma of avocado seeds, while 57.1% stated that it had a very strong aroma.

Comparison of concentration of hair tonic cosmetic preparations from avocado seed extract based on panelist preferences (hedonic test)

Based on the hedonic test results for F1 in Table 1, it can be seen that 42.9% of panelists expressed a dislike for the hair tonic made from avocado seed extract, while 57.1% indicated that they liked the hair tonic made from avocado seed extract.

Based on Table 2, it can be seen that 28.6% of panelists expressed a dislike for the hair tonic made from avocado seed extract, 57.1% of panelists indicated that they liked the hair tonic

made from avocado seed extract, and 14.3% stated that they liked it very much.

Based on Table 3, it can be seen that 28.6% of panelists expressed that they liked the hair tonic made from avocado seed extract, while 71.4% stated that they liked it very much.

Table 1. Frequency Distribution of F1 (0.5%)

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Dislike	3	42.9	42.9
	Like	4	57.1	100.0
	Total	7	100.0	100.0

Table 2. Frequency Distribution of F2 (1%)

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Dislike	2	28.6	28.6
	Like	4	57.1	85.7
	Really like	1	14.3	100
	Total	7	100	100

Table 3. Frequency Distribution of F3 (1.5%)

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Dislike	2	28.6	28.6
	Like	5	71.4	100.0
	Total	7	100.0	100.0

Prerequisite test analysis

Normality test

The normality test was conducted using the Kolmogorov-Smirnov (K-S) test. The significance level used as the basis for accepting or rejecting whether a data distribution is normal was 0.01. It was considered normal if Sig > Alpha 0.01. The results of the normality test calculations for each indicator to be tested can be seen in Table 4. Sig. 0.20 > 0.01 indicated that the data was normally distributed and met the requirements for the ANOVA test.

Table 4. Results of the Normality Test

		Unstandardized Residual
N		7
Normal Parameters	Mean	.0000000
	Std. Deviation	.87549324
Most Extreme Differences	Absolute	.166
	Positive	.166
	Negative	-.118
Test Statistic		.166
Asymp. Sig. (2-tailed)		.200

Homogeneity test

The homogeneity test was used to determine whether the group variances were homogeneous. For this purpose, Levene’s statistic test was used with the assistance of SPSS software can be seen in Table 5.

Table 5. Homogeneity Test Results

		Levene Statistic	df1	df2	Sig.
Color	Based on mean	1.664	2	18	.217
	Based on median	1.400	2	18	.272
	Based on median and with adjusted df	1.400	2	16.667	.274
	Based on trimmed mean	1.891	2	18	.180
Aroma	Based on mean	1.663	2	18	.217
	Based on median	.955	2	18	.404
	Based on median and with adjusted df	.955	2	16.884	.405
	Based on trimmed mean	1.615	2	18	.226
Likes	Based on mean	.190	2	18	.829
	Based on median	.176	2	18	.840
	Based on median and with adjusted df	.176	2	17.876	.840
	Based on trimmed mean	.252	2	18	.780

Color: A Sig. value of 0.03 > 0.01 indicated no difference in the average values among the formulas. Aroma: A Sig. value of 0.190 > 0.01 indicated no difference in the average values among the formulas. Panelist Preference: A Sig. value of 0.04 > 0.01 indicated no difference in the average values among the formulas.

Discussion

Preparation of hair tonic from avocado seed extract

The process of preparing the hair tonic in this study follows a methodology similar to previous research which demonstrated that hair tonics made from plant extracts, particularly avocado seeds, can provide stable formulations that are safe for use in hair care products (Febriyanti et al., 2024). The extraction process began with the separation and cleaning of avocado seeds, followed by drying and coarsely grinding. A maceration extraction method using 96% ethanol was then applied to obtain the avocado seed extract. This method is widely recognized for its efficiency in extracting bioactive compounds such as tannins, flavonoids, and saponins, which are beneficial for hair health (Dabas et al., 2013; Sarinastiti, 2018).

The results obtained from the maceration process yielded 20.14 grams of extract, which

were then incorporated into three different formulations (F1: 0.5%, F2: 1%, F3: 1.5% avocado seed extract). The formulation process involved creating homogeneous solutions using solvents like ethanol, sodium metabisulfite, and propylene glycol, ensuring the proper dissolution and stability of the active compounds.

The final hair tonic formulation was prepared by combining these solutions and adjusting the volume to 100 ml. This approach is consistent with cosmetic formulation practices that aim to balance the active ingredients with stabilizers and solvents to maintain the product's effectiveness and safety for use on the scalp (Tranggono & Latifa, 2007).

Laboratory test results

The laboratory tests conducted to assess the pH of the hair tonic formulations (F1 = 5.8, F2 = 6.2, F3 = 6.3) indicated that the formulations were within the safe pH range for use on the scalp. The pH of topical preparations is critical because it can affect the skin's barrier function and contribute to irritation or discomfort if the product is too acidic or alkaline (Barus & Meliala, 2022). The findings from this research align with previous research, which suggest that hair care products should ideally have a pH between 4.5 and 6.5 to ensure compatibility with the skin's natural pH (Oktari & Rosalina, 2023). Thus, all formulations in this research met the necessary pH requirements, supporting their safety for topical use.

The organoleptic and hedonic test results further demonstrate that the formulation containing 1.5% avocado seed extract (F3) was the most preferred by panelists. This preference for F3, in terms of color (85.7% yellowish-orange) and aroma (57.1% strong characteristic scent), suggests that a higher concentration of avocado seed extract enhanced the sensory attributes of the hair tonic. These findings were consistent with previous studies that found plant-based extracts like avocado to be effective not only for their therapeutic properties but also in contributing to the sensory experience of hair care products (Leite et al., 2009; Oboh et al., 2016). The pleasant color and aroma are important factors in consumer acceptance, as they directly influence the product's appeal and perceived efficacy.

Results of hair tonic preparation from avocado seed extract based on organoleptic testing

Organoleptic testing is a sensory assessment that utilizes human senses to observe the texture, color, shape, aroma, and taste of a food, beverage, or medicinal product to ensure consumer acceptance (Sari & Ayustaningwarno, 2014). Based on previous research, the evaluation of the concentration comparison in the preparation of hair tonic from avocado seed extract consists some of the following things (Oktari & Rosalina, 2023).

Color

The organoleptic test for color showed that Formula F3, with a concentration of 1.5% avocado seed extract, was the most favored by the panelists, with 85.7% of them identifying a very strong yellow-orange color, typical of avocado seeds. This result was significant because the color of a cosmetic product influences its attractiveness and acceptance. Previous studies have shown that natural ingredients, such as avocado extract, are often preferred for their rich, natural colors, which are associated with the presence of bioactive compounds like carotenoids and flavonoids (Leite et al., 2009; Dabas et al., 2013).

This preference for a deeper, more vivid color in F3 can be linked to higher concentrations of these compounds, suggesting that avocado seed extract contributes not only to the product's aesthetic appeal but also to its potential health benefits. Furthermore, the presence of such compounds may enhance the overall perception of the product's efficacy and quality (Praharyawan, 2012).

In comparison, F1 and F2, with lower concentrations of extract, showed less pronounced color, suggesting that the concentration of avocado seed extract directly influences the visual appeal of the hair tonic. This finding highlights the importance of optimizing cosmetic formulations' ingredient concentrations to meet aesthetic and functional expectations.

Aroma

The aroma evaluation revealed that F3 was the most preferred, with 57.1% of panelists indicating a very strong characteristic aroma of avocado seeds. Aroma is critical in consumer acceptance, especially for personal care products like hair tonics. A pleasant scent can enhance the

overall experience and perceived effectiveness of the product (Oktari & Rosalina, 2023). The strong aroma of avocado seeds in F3 can be attributed to the higher concentration of the active compounds responsible for its distinctive scent, including flavonoids and alkaloids, which are known to contribute to the characteristic smell of avocado seed extracts (Leite et al., 2009; Sarinastiti, 2018).

In contrast, the lower concentrations in F1 and F2 were associated with weaker scents, supporting the idea that the concentration of the extract plays a crucial role not only in the efficacy but also in the sensory characteristics of the hair tonic. Previous study had emphasized that aromatic compounds in natural extracts can influence consumer preferences and may serve as a differentiating factor for commercial products (Oboh et al., 2016).

Results of hair tonic preparation from avocado seed extract based on hedonic testing (panelists' preference)

Panelist preferences strongly favored Formula F3, with 71.4% rating it as "very liked" indicating a significant preference for the higher concentration of avocado seed extract (1.5%). This result aligned with the findings from the color and aroma tests, where F3 also performed best regarding sensory appeal. The panelists' preference for the higher concentration of avocado seed extract suggests that the combination of pleasing color and aroma, along with the potential efficacy of the extract, enhanced the overall acceptability of the product.

This is consistent with previous research that showed consumer preference for natural and potent formulations, particularly in the context of hair care products aimed at addressing common issues like hair loss (Febriani et al., 2016; Ramadhanti et al., 2021). The preference for F3 supports the idea that increasing the concentration of active ingredients, such as avocado seed extract, can improve the product's appeal to consumers, both in terms of aesthetics and performance. However, it is also important to consider the balance between ingredient concentration, cost, and consumer safety when formulating cosmetic products.

Comparison of concentration in hair tonic preparation from avocado seed extract

ANOVA testing showed no significant differences in the results for color, aroma, and panelist preference when comparing the three formulations (F1: 0.5%, F2: 1%, F3: 1.5%). While the differences in color and aroma were notable in terms of panelist preferences, statistical analysis indicated that the variations in concentrations did not significantly affect the outcomes across the three groups ($p > 0.01$).

This finding suggests that while higher concentrations of avocado seed extract may improve sensory attributes like color and aroma, the increase in concentration does not necessarily translate to a statistically significant difference in panelist preference. This could imply that the optimal concentration for achieving desired sensory characteristics might be achieved even at lower concentrations (F2, 1%) without compromising consumer satisfaction.

The lack of significant differences in statistical terms, despite sensory preferences, emphasizes the need for further investigation into the relationship between concentration and consumer perception. Future studies could explore a broader range of concentrations and test long-term consumer satisfaction to determine the most effective formulation.

CONCLUSION

The results of this research indicate that avocado seed extract has potential as an active ingredient in hair tonic preparations, with positive outcomes observed in sensory properties such as color, aroma, and overall panelist preference. Formula F3, containing 1.5% avocado seed extract, was preferred by the panelists, exhibiting the most intense yellow-orange color and a strong characteristic aroma. Furthermore, the pH levels of all formulations were within the acceptable range for scalp use, suggesting that avocado seed extract can be safely incorporated into hair care products.

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