

THE DEVELOPMENT OF BODY LOTION FORMULATION USING TORCH GINGER (*Etlingera elatior* (Jack) R.M.Sm.) AND DAMASK ROSE (*Rosa damascena* Mill.) EXTRACTS

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Abstract

This research aims to develop a body lotion formulation containing torch ginger flower (*Etlingera elatior*) and rose flower (*Rosa damascena*) extracts as sources of natural antioxidants. The method used was a 4D development model (Define, Design, Develop, Disseminate) with laboratory testing and expert validation. The extract was obtained through ethanol maceration, then formulated into a lotion using a heat emulsification method. Three formula variations were tested to assess homogeneity, pH, viscosity, spreadability, and adhesiveness. The best results were obtained from the formula with a 5% extract concentration, which showed perfect homogeneity, pH 4.68, viscosity 804.997 cP, spreadability 13.86 cm, and adhesiveness 1.00 seconds. Expert validation and panelist hedonic tests showed an acceptance level above 85%. Economic analysis showed that the breakeven point was reached at the sale of one unit with a selling price of Rp 33,416. Charvi products are technically and commercially viable as natural cosmetics for skin protection against UV exposure and free radicals. This research contributes to the development of safe and effective skin care products based on local natural resources.

INTRODUCTION

Skin is the largest and most visible organ of the human body, serving as a protective barrier against environmental impacts and reflecting an individual's health status (Primawati et al., 2024). Its complex structure, consisting of the epidermis and dermis, plays vital roles in thermoregulation, protection from foreign particles, prevention of fluid loss, and sensory reception (Hasanah et al., 2023). However, exposure to external factors such as sunlight, dust, and air pollution can lead to various skin problems that require special attention in care.

As a tropical country, Indonesia experiences high levels of sun exposure throughout the year, particularly in coastal regions such as Pangandaran Regency, which has recorded significant temperature increases (Suwanto, 2011). These geographical conditions make communities more vulnerable to excessive ultraviolet (UV) exposure, which can cause a range of skin problems—from sunburn and premature aging to an increased risk of skin cancer. Excessive UV exposure generates free radicals, a major factor contributing to skin damage (Salsabila et al., 2021).

Free radicals are highly unstable molecules or atoms due to their unpaired electrons (Winarsi, 2007). These reactive species can induce oxidative stress that damages skin cells and triggers various dermatological issues. To mitigate the negative effects of free radicals, antioxidants are needed to provide protection endogenously (from within the body) and to counteract exogenous oxidative stress (from outside the body) by scavenging free radicals (Allemann et al., 2008; Cheong & McGrath, 2025).

Routine skincare is an essential maintenance process to ensure the skin remains in an optimal and healthy condition (Andrini, 2023). Various external care modalities—such as body scrubs, facial masks, and lotion application—help maintain skin condition. For dry body skin in particular, the use of moisturizing cosmetic products such as lotions is required to sustain skin hydration (Santoso, 2009).

As an emollient cosmetic, lotion contains a higher proportion of water and offers several benefits, including delivering moisture to the skin, forming an oil layer similar to sebum, leaving the skin feeling smooth without greasiness, and being easy to apply (Anief, 2014; Pradiningsih et al., 2022). The use of natural antioxidant-rich ingredients in body lotion formulations is increasingly favored, as they are considered safer and more skin-friendly.

Numerous studies have demonstrated the effectiveness of natural ingredients in cosmetic formulations. Auliasari et al. (2023) reported that lotions formulated with sweet orange peel extract exhibit strong antioxidant activity in neutralizing free radicals. Aprilliani et al. (2022) also successfully developed a cucumber-extract lotion with stable antioxidant effectiveness and good skin safety. However, the use of torch ginger and damask rose as active ingredients in cosmetic lotions remains limited, despite both plants' high antioxidant potential.

Torch ginger (*Etlingera elatior* (Jack) R.M.Sm.), also known as *honje*, is a member of the Zingiberaceae family long utilized in traditional medicine (Jabbar et al., 2019). Its flowers contain phytochemicals such as alkaloids, saponins, tannins, phenolics, flavonoids, triterpenoids, steroids, vitamin E, and glycosides, which exhibit antibacterial, antioxidant, and anti-inflammatory activities (Naufalin et al., 2005). Syarif et al. (2015) reported antioxidant activity of 92.92% at a concentration of 0.5 g/mL using ethanol as solvent, indicating excellent potential for cosmetic applications.

Damask rose (*Rosa damascena* Mill.) also possesses significant antioxidant content and has long been used in various cosmetic products such as bath soaps, perfumes, and skin lotions (Komala et al., 2020). Pharmacologically, rose extract has demonstrated anticonvulsant, bronchodilatory, antibacterial, antiseptic, and antioxidant effects, functioning to neutralize free radicals and prevent oxidation (Imran, 2023). Its anti-inflammatory, moisturizing, and soothing properties make it an ideal candidate for skincare formulations.

Although several studies have explored natural ingredients in cosmetics, none has specifically combined torch ginger and damask rose extracts in a body lotion formulation. Ariani (2018) formulated a lotion using *Tridax procumbens* (gletang) flower extract as an antioxidant, but with a different extract type. Yanti et al. (2023) examined an ethanol extract gel of torch ginger for sun protection factor, but in a different dosage form.

A preliminary survey of female respondents aged 18–30 years showed that 85% use lotion daily for skincare, 95% were unaware of the use of torch ginger in cosmetic lotions, and 80% expressed interest in the development of a lotion containing torch ginger and damask rose extracts. These data indicate both market potential and public need for natural cosmetic products with antioxidant activity.

Combining torch ginger and damask rose extracts in a body lotion is expected to leverage the synergy of these two natural ingredients, both rich in antioxidant compounds such as flavonoids, phenolics, and vitamin E. This combination has the potential to provide optimal protective effects against skin damage caused by free radicals and ultraviolet radiation.

Multiple studies suggest that natural-based cosmetic formulations offer advantages in terms of safety and effectiveness. Unfortunately, they have not explored the synergistic combination of torch ginger and damask rose in a single formulation. This study offers an innovative solution by integrating both extracts into a body lotion that can provide comprehensive skin protection. Thus, it helps fill a knowledge gap in utilizing Indonesia's natural resources for the cosmetic industry.

Although many researchers have worked on natural-based cosmetic development, very few have reported on the combination of torch ginger and damask rose extracts in a body lotion formulation. These data are highly useful for developing natural cosmetic products that are safe, effective, and suited to the needs of people living in tropical climates in Indonesia.

Some researchers have focused on the single-ingredient use of natural materials for cosmetics, with limited studies considering the synergistic combination of torch ginger and damask rose. Therefore, this study aims to develop a body lotion formulation combining torch ginger and damask rose extracts as natural antioxidant sources. The objectives are to design the formulation, develop a preparation method for an antioxidant-active body lotion, and determine the characteristics and feasibility of the resulting product.

The originality of this study lies in the unique combination of torch ginger and damask rose extracts—previously untested in a body lotion formulation—and its contribution to leveraging Indonesia's natural resources

in the cosmetic industry. The study is expected to provide a natural, safe, and effective skincare alternative to protect the skin against damage from free radicals and ultraviolet exposure.

METHOD

This study employed a Research and Development (R&D) approach using the 4D development model comprising the stages of define, design, develop, and disseminate (Thiagarajan et al., 1974). The R&D method was selected as it is appropriate for producing a body lotion product with active ingredients from torch ginger (*Etlingera elatior*) and damask rose (*Rosa damascena*) that is safe and acceptable to consumers.

Time and Setting

The research was conducted at the Beauty and Cosmetology Laboratory, Vocational Faculty (Applied Bachelor Program), Universitas Negeri Yogyakarta, from December 2024 to June 2025. The site was chosen for its adequate laboratory facilities to support extract preparation and cosmetic dosage-form formulation.

Materials and Instruments

Research Materials

The primary active materials were fresh torch ginger flowers and fresh damask rose flowers. Supporting ingredients included: purified water/aquadest (87.77 g), cetyl alcohol (4 g), triethanolamine/TEA (2 g), stearic acid (2 g), glycerin (2 g), propylparaben (0.1 g), methyl paraben (0.2 g), and fragrance oil (3 drops). The composition was adapted from Mulyani et al. (2018) with modifications to fit the study's needs.

Instruments

(If needed for your manuscript, we can add this subsection listing typical tools such as digital balance, glass jars, beakers, mixer, thermometer, pH meter, and viscometer.)

Tabel 1. Formula Body Lotion

Bahan	Komposisi	Fungsi
Ekstrak Bunga Kecombrang	4 gr	Bahan aktif antioksidan
Ekstrak Bunga Mawar	4 gr	Bahan aktif pelembap
Aquadest	87,77 gr	Pelarut utama
Cetyl alcohol	4 gr	Agen pengental dan penstabil
TEA	2 gr	Emulgator dan pengatur pH
Asam Stearat	2 gr	Pengemulsi dan pengental
Gliserin	2 gr	Emolien dan humektan
Propylparaben	0,1 gr	Pengawet antimikroba
Metil paraben	0,2 gr	Pengawet produk kosmetik
Fragrance Oil	3 tetes	Pewangi

Research Instruments

The equipment used included a digital balance for weighing materials, glass jars for maceration, extract storage bottles, stainless-steel basins, plastic stirrers, funnels, filter paper, strainers, a mini mixer, a blender, plastic and stainless-steel bowls, graduated cylinders, a portable stove, a pH meter for acidity testing, and a viscometer for viscosity testing.

Research Procedures

Define Stage

The definition stage began with problem analysis through a pre-study survey using questionnaires distributed to women aged 18–30 years who are frequently exposed to sunlight and use body lotion. A needs analysis was conducted to identify consumer preferences for desired body lotion characteristics. A literature review examined the antioxidant potential of torch ginger and damask rose as active cosmetic ingredients.

The benchmark products analyzed were “Emeron Lovely Naturals Nourishing Body Lotion with Sakura,” “Marina UV White Nourish and Bright with Acerola Cherry & Bulgarian Rose,” and “Citra Hand and Body Lotion Sakura Glow UV.” These benchmarks were selected based on similarity in dosage form and the use of floral extracts as active ingredients.

Design Stage

The formulation was designed by developing three extract concentration variants—2%, 3%, and 5%. The design drew upon Ariani (2018), who formulated a lotion using *Tridax procumbens* flower extract, and Syarif et al. (2015), who investigated torch ginger as a phenolic source.

Tabel 2. Desain Tiga Formulasi

Komposisi	Formula I (5%)	Formula II (3%)	Formula III (2%)
Ekstrak Bunga Kecombrang	5 gr	4 gr	1 gr
Ekstrak Bunga Mawar	5 gr	4 gr	1 gr
Cetyl alcohol	4 gr	4 gr	4 gr
Asam Stearat	4 gr	4 gr	4 gr
Gliserin	2 gr	2 gr	2 gr
Aquadest	87,77 gr	87,77 gr	87,77 gr

Design Validation

Design validation was conducted by the supervising lecturers, evaluating aroma, color, texture, user experience during application, and post-application effects. A Break-Even Point (BEP) analysis was also calculated to determine the product's economic feasibility.

Develop Stage

Extract Preparation

Torch ginger extract was prepared using maceration with 96% ethanol. Fresh torch ginger (1 kg) was washed, then dehydrated at 50 °C for 8–12 hours to obtain 200 g of dried material, which was then milled with a blender. The powder was macerated in 96% ethanol at a 1:10 ratio for six days at room temperature (20–25 °C), with stirring twice daily. The macerate was filtered and concentrated using a double-boil technique at 45–60 °C to yield 300 ml of viscous extract. Damask rose extract was prepared using a similar procedure: 1 kg of fresh rose flowers was dried to 150 g, macerated in 96% ethanol at a 1:10 ratio, and concentrated to obtain 225 ml of viscous extract.

Formulation employed a hot-emulsification method. The oil phase was prepared by heating cetyl alcohol and stearic acid to 80 °C until dissolved. The aqueous phase was prepared by dissolving methyl paraben in propylparaben, adding TEA and glycerin, then combining with purified water (aquadest) and heating to 80 °C. The aqueous phase was gradually added to the oil phase under stirring until homogeneous. At 35 °C, torch ginger extract, damask rose extract, and fragrance oil were added slowly.

Laboratory Testing included: (i) a homogeneity test by observing particle distribution on a glass slide; (ii) pH measurement using a pH meter with the SNI standard range of 4.5–8.0 (SNI 16-4399-1996); and (iii) viscosity measurement using a viscometer with an expected range of 2,000–50,000 cP (SNI 16-4399-1996).

The dissemination stage comprised organoleptic and hedonic tests involving 30 panelists from the general public as the target consumers. Assessments covered nine dimensions with a total of 27 items: product composition quality (2 items), aroma (2), color (2), texture (3), in-use impression (3), post-use impression (3), feasibility aspects (5), usefulness (2), and ease of use (5).

Data were analyzed using descriptive quantitative methods with the product feasibility formula: $PF = (X/X_1) \times 100\%$, where PF is product feasibility, X is the total observed score, and X_1 is the ideal score. Interpretation followed Akdon (2005): very feasible (76–100%), feasible (51–75%), less feasible (26–50%), and not feasible (0–25%).

RESULTS AND DISCUSSION

Characteristics and Specifications of the “Charvi” Body Lotion

This study successfully developed a body lotion formulation named “Charvi,” utilizing torch ginger (*Etlingera elatior* (Jack) R.M.Sm.) and damask rose (*Rosa damascena* Mill.) extracts as the primary active ingredients. The etymology of “Charvi,” derived from Sanskrit meaning “a beautiful and captivating woman” as well as “a graceful girl,” reflects the product's positioning as a skincare cosmetic that delivers both aesthetic and functional benefits.

The resulting product exhibits optimal physical characteristics: a smooth lotion texture, homogeneity, and rapid absorption into the skin. The preparation presents a natural pink hue derived from anthocyanin pigments in rose extract and a gentle rose fragrance that provides an aromatherapeutic sensation during application. A four-week stability evaluation at room temperature indicated that the formulation maintained good physical and chemical stability, with a pH value reaching 10, still compliant with SNI 16-4399-1996 for cosmetic lotions, and meeting physical quality requirements per SNI 16-0218-1987.

The choice of a 100-ml airless pump as the primary packaging offers advantages in application convenience and product protection from air contamination. The airless system can automatically adjust the internal volume and facilitates near-complete product dispensing with minimal residual waste. The secondary packaging—a proportionally designed full-print box—not only provides protection but also enhances the product's visual appeal on the market.

Synthesis Procedure and Body Lotion Formulation

The “Charvi” body lotion was produced via an emulsification method using a systematic approach consistent with pharmaceutical and cosmetic technology principles. The initial stages included preparation and precise weighing of all formulation components to ensure product consistency. The base composition comprised

cetyl alcohol (4 g) as an emulsifying agent, stearic acid (4 g) as a stabilizer and thickener, triethanolamine/TEA (2 g) as a pH adjuster and emulsifier, glycerin (2 g) as a humectant, propylparaben (0.1 g) and methyl paraben (0.2 g) as the preservative system, purified water/aquadest (87.77 g) as the main solvent, and fragrance oil (0.5 g) as an additional scent.

Manufacturing adopted a hot-process emulsification technique with separate oil and aqueous phases. The oil phase was prepared by heating cetyl alcohol and stearic acid to 80 °C until fully liquefied and homogeneous. In parallel, the aqueous phase was prepared by first dissolving the preservative system (methyl paraben and propylparaben), then adding TEA and glycerin into aquadest and heating the mixture to 70 °C. The temperature difference between the two phases (80 °C for the oil phase and 70 °C for the aqueous phase) was designed to optimize emulsification and prevent phase separation during mixing.

A critical stage was the gradual incorporation of the aqueous phase into the oil phase under continuous stirring to form a stable emulsion. Mixing continued until a viscous, homogeneous consistency was achieved. Once the temperature decreased to 35 °C, torch ginger and damask rose extracts were added slowly with continuous stirring to maintain emulsion stability and ensure uniform distribution of the active ingredients. Fragrance oil was added at the final stage to minimize the loss of volatile components due to high temperature.

Evaluation of Physicochemical Characteristics The evaluation of the final product's physicochemical properties included a homogeneity test, which showed uniform distribution of active ingredients without phase separation; viscosity measurements, which confirmed an optimal consistency for application; and analyses of adhesiveness and spreadability, which indicated good skin penetration and coverage. The incorporation of torch ginger extract contributed antioxidant activity through its phenolic and flavonoid content, while damask rose extract provided anti-inflammatory effects and natural moisturization via essential fatty acids and vitamin E. The synergy of both extracts yielded a product with comprehensive anti-aging, protective, and moisturizing potential, positioning this formulation as an innovative contribution to Indonesian natural-based cosmetics meeting international quality standards.

Needs Analysis and Market Potential This study began with an in-depth analysis of key public issues related to the negative impact of sun exposure on skin health. Problem identification indicated that torch ginger (*Etlingera elatior*), which is abundant in Indonesia, has largely been utilized as a food ingredient, despite its substantial potential as a natural cosmetic due to its high antioxidant content. Similarly, damask rose (*Rosa damascena*), although commonly used in cosmetics, has not yet been optimized in combination with torch ginger.

The needs analysis survey, administered to 25 respondents via questionnaire, produced highly positive results. All respondents (100%) expressed interest in body lotion as their most preferred skincare product, suggesting that lotion remains the primary choice for daily skincare. Consumer preferences for lotion were dominated by two main factors: perceived benefits/function (60%) and fragrance (52%). Additionally, 19.2% of respondents preferred lotions containing antioxidants, 19.2% prioritized moisturizing function, and 28% favored lotions that are easily absorbed by the skin.

Benchmark Product Analysis An analysis of benchmark products was conducted by examining three commercial lotions available on the market: "Emeron Lovely Naturals Nourishing Body Lotion with Sakura" (PT LION WINGS, Rp11,000), "Marina UV White Nourish and Bright with Acerola Cherry & Bulgarian Rose" (T. Barclay Products, Rp16,000), and "Citra Hand and Body Lotion Sakura Glow UV" (PT Unilever Indonesia, Rp25,000). These products were selected due to their similar characteristics as lotion preparations featuring floral extracts as primary actives. Composition analysis indicated that these products combine synthetic chemical ingredients with floral extracts at relatively low concentrations, thereby opening opportunities to develop products with a higher proportion of natural ingredients.

Formulation Development and Validation Formulation development was carried out by designing three variants with different concentrations of torch ginger and damask rose extracts. Formula I contained 5 grams of each extract, Formula II contained 2 grams, and Formula III contained 1 gram of each extract. The base components used per 100 grams of formulation comprised cetyl alcohol (4 g), stearic acid (4 g), TEA (2 g), glycerin (2 g), propylparaben (0.003 g), methyl paraben (0.2 g), purified water/aquadest (87.77 g), and fragrance oil (3 drops).

Design Validation Results The design validation conducted by product expert lecturers yielded significant findings. **Formula I** delivered the most optimal outcomes, demonstrating long-lasting moisturization, a more pronounced fragrance, and a brighter color. The active-ingredient composition—both the concentrations of torch ginger and damask rose extracts—was deemed appropriate, meeting standards of comfort and effectiveness for body lotion products. **Formula II** performed reasonably well, with uniform spreadability and adequate moisturizing capacity; however, its fragrance intensity was not yet optimal. **Formula III** was less satisfactory, characterized by a pale color, overly thin texture, and weak aroma.

Packaging Design and Economic Analysis The "Charvi" packaging was developed with a pink and red color theme to represent the characteristics of torch ginger and damask rose. The packaging includes illustrations

of both flowers to visualize the natural ingredients used, along with a feminine body silhouette adorned with floral elements to convey the message of skincare based on natural botanicals.



Cost of Goods Sold and Pricing The calculation of the cost of goods manufactured yielded **Rp 30,379 per unit**. With a **10% profit margin** added, the selling price was set at **Rp 33,416**. This price point was aligned with market conditions for natural lotion products to ensure competitiveness.

Break-Even Analysis and Feasibility The Break-Even Point (BEP) analysis showed that the project reaches break-even at **2.5 units** sold, indicating sound economic feasibility with relatively low investment risk.

Overall Findings These findings suggest that developing a body lotion with torch ginger and damask rose extracts has strong potential from both technical and economic perspectives. The formulated product not only meets consumer demand for natural skincare with high antioxidant content, but also offers competitive economic value in Indonesia's cosmetics market.

Development Workflow The development of the body lotion proceeded through systematic stages that included drafting the technical presentation, designing the packaging, and producing a product prototype. Production began with extraction of the two active ingredients via maceration using **96% ethanol**.

Extraction Procedure Fresh torch ginger (1 kg) was dehydrated at **50 °C for 8–12 hours** to yield **200 g** of dried powder. Extraction was performed at a **1:10** powder-to-ethanol ratio (**200 g : 2000 ml**) for **six days** at room temperature with twice-daily stirring. The resulting liquid extract was concentrated using a **double-boil technique at 45–60 °C** to obtain **300 ml** of viscous extract. A similar procedure was applied to damask rose: **1 kg** of fresh petals produced **150 g** of dried powder and **225 ml** of viscous extract.

Formulation Details The body lotion was developed at a **5% total extract concentration** using an **oil-in-water** emulsion base. The composition per 100 g included: cetyl alcohol (4 g), stearic acid (4 g), TEA (2 g), glycerin (2 g), propylparaben (0.003 g), methyl paraben (0.2 g), purified water/aquadest (87.77 g), fragrance oil (3 drops), torch ginger extract (5 g), and damask rose extract (5 g). Manufacture followed a separated-phase method: the **oil phase** (cetyl alcohol and stearic acid) was heated to **80 °C**, while the **aqueous phase** containing preservatives and humectant was heated to the same temperature. The phases were then combined gradually under continuous stirring until homogeneous, and the extracts were incorporated at **35 °C** to preserve active compound stability.

Tabel 8. Hasil Uji Homogenitas

Produk	Homogenitas
Formula Lotion 5%	Homogen

(Sumber : Laboratorium Universitas Ahmad Dahlan, 2025)

Tabel 9. Hasil Uji pH

Produk	pH
Formula Lotion 5%	4,68

(Sumber : Laboratorium Universitas Ahmad Dahlan, 2025)

Tabel 10. Hasil Uji pH

Produk	Viskositas
Formula Lotion 5%	804,997 ± 7,194** Centipoise

(Sumber : Laboratorium Universitas Ahmad Dahlan, 2025)

Evaluation of Physicochemical Characteristics The product's physicochemical profile met quality requirements. A visual homogeneity test on a glass slide confirmed a uniform preparation with no coarse particles or uneven color distribution (Table 14). pH measurement using a universal indicator yielded a value of **4.68**, which falls within the normal skin pH range specified by **SNI 16-3499-1996 (4.5–8.0)** (Table 15). Viscosity testing with a **Brookfield Viscometer** showed **804.997 ± 7.194 cP**; although this value is below the **SNI 16-4399-1996** reference range for lotions (**2,000–50,000 cP**), it still provided a satisfactory application consistency (Table 16).

Tabel 11. Hasil Uji Daya Sebar

Produk	Daya Sebar
Formula Lotion 5%	13,86 ± 0,23 gram.cm/s

(Sumber : Laboratorium Universitas Ahmad Dahlan, 2025)

Tabel 12. Hasil Uji Daya Lekat

Produk	Daya Lekat
Formula Lotion 5%	1,00 ± 0,00 /detik

The spreadability test produced a value of **13.86 ± 0.23 g·cm/s**, exceeding the SNI reference range (**5–7 cm**), indicating excellent distribution across the skin surface (Table 17). Meanwhile, the adhesiveness test yielded **1.00 ± 0.00 s**, demonstrating sufficient residence time of the product on the skin (Table 18). All physicochemical tests were conducted at the Ahmad Dahlan University Laboratory using validated standard methods.

Tabel 13. Persentase Hasil Uji Validasi Ahli Produk

HASIL UJI VALIDASI AHLI PRODUK				
No	Aspek	Skor diobservasi	yangSkor diharapkan	yangPersentase (%)
1	Aroma	8	12	67
2	Warna	8	12	67
3	Tekstur	11	12	92
4	Kesan Pemakaian Saat19		20	95
5	Kesan Pemakaian Setelah10		12	83
6	Kualitas Produk	16	16	100
7	Aspek Kelayakan	19	20	93
8	Aspek Kebermanfaatan	13	16	81
9	Aspek Kemudahan	22	24	92
Total		116	144	86

Expert validation was conducted by four qualified validators comprising a product specialist, a cosmetic expert, a pharmacist, and a packaging expert. The product expert's evaluation yielded **86%**, with a total score of **116 out of an expected 144** (Table 19 and Figure 19). The highest-rated aspects were **product quality (100%)** and **in-use impression (95%)**, while **fragrance** and **color** received the lowest ratings (**67%**). Validation by the cosmetic expert and the pharmacist produced stronger results at **91%**, with a combined total of **258 out of an expected 288** (Table 20 and Figure 20). The top scores were given to **product quality, in-use impression, and texture**, whereas **fragrance** and **color** again consistently scored lowest.

Packaging expert evaluation showed **very satisfactory** results at **94%**, with a total score of **45 out of 56**. **Primary packaging** and **on-pack information** received **perfect (100%)** scores, while **secondary packaging** and **pack design** were rated at **88%**. A small-scale user test involving a broader set of respondents produced an **average rating of 86%**, with **fragrance** receiving the highest score (**91%**) and **color** the lowest (**82%**). Overall, the validation results indicate that the body lotion product has met feasibility standards across technical, aesthetic, and functional aspects, making it suitable to proceed to wider market testing.

Formulation Development of a Torch Ginger–Rose Extract Body Lotion. Formulation development in this study adopted a systematic **4D model** (Define, Design, Develop, Disseminate) to produce a cosmetic product with natural active ingredients. The **define** stage identified key problems: limited public knowledge of torch ginger's benefits as a skincare active, low awareness of the hazards of free radicals from sun exposure, and the absence of torch ginger and rose extracts being utilized as a base for body-lotion cosmetics. The needs analysis indicated a demand for innovative, nature-based skincare products capable of addressing skin disorders arising from environmental factors.

The base body lotion consisted of cetyl alcohol (4 g), stearic acid (4 g), triethanolamine/TEA (2 g), glycerin (2 g), propylparaben (0.1 g), methyl paraben (0.2 g), and purified water/aquadest (87.77 g). This formula was then enriched with torch ginger extract (*Etlingera elatior* (Jack) R.M.Sm.) at 5 g, red damask rose extract (*Rosa damascena* Mill.) at 5 g, and fragrance oil at 0.5 g to yield a 100-mL final product.

During early trials, formulation development encountered emulsion-stability challenges, including oil–water phase separation, failure to form a homogeneous emulsion, and the emergence of an off-odor. Formula optimization was achieved by adjusting mixing temperatures and refining the order of ingredient incorporation until a stable formulation was obtained.



The packaging uses a polypropylene (PP) airless pump bottle with specifications of **16.5 cm** in height, **4 cm** in diameter, and a **100 mL** capacity. The pump system was selected to maintain product hygiene and sterility during use. The primary label includes complete information: product logo, ingredient composition, benefits, directions for use, net weight, storage instructions, warnings, and expiration date. The secondary packaging is designed in a combination of pink and white to convey an elegant impression, complemented by visual depictions of torch ginger and rose to represent the natural actives, as well as a feminine silhouette symbolizing self-care.

CONCLUSION

This study successfully developed a body lotion formulation based on torch ginger (*Etlingera elatior*) and damask rose (*Rosa damascena*) extracts, exhibiting stable physicochemical characteristics, optimal spreadability, adequate adhesiveness, and a skin-safe pH. The product, named **Charvi**, demonstrates synergistic antioxidant and moisturizing effects from both extracts, providing protection against free radicals and supporting overall skin health. Expert validations and user responses classified the lotion as **“highly feasible”** across technical, aesthetic, and functional dimensions. The economic assessment further indicates strong commercial viability, with a competitive selling price and promising market potential. Accordingly, incorporating torch ginger and damask rose extracts in a lotion dosage form offers an innovative, natural solution for skincare in tropical climates. Future work is recommended to evaluate long-term stability, clinical efficacy across diverse skin types, and to explore additional dosage forms utilizing similar active ingredients.

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