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Research Article

A Novel Formulation and Evaluation of Polyherbal Gel Body Wash

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ABSTRACT

This study focuses on the novel formulation and evaluation of a polyherbal gel-based body wash incorporating Hylocereus undatus (dragon fruit) extract. Dragon fruit is rich in bioactive compounds such as vitamin C, flavonoids, polyphenols, and betalains, which provide antioxidant, moisturizing, and skin-protective properties. The aim of this work is to develop a natural, safe, and effective herbal body wash as an alternative to synthetic surfactant-based cleansers. Objective: The objective of the study is to formulate a stable polyherbal gel body wash using dragon fruit extract and evaluate its physicochemical properties, skin compatibility, cleansing efficiency, and antioxidant potential. Methods: The gel formulation was prepared using suitable natural gelling agents, mild surfactants, preservatives, and polyherbal extracts including dragon fruit. The formulated body wash was evaluated for pH, viscosity, spreadability, foam height and stability, washability, and stability studies. Antioxidant activity was assessed using standard in vitro methods, and skin irritation potential was also evaluated. Results: The formulated gel body wash showed acceptable physicochemical characteristics with a skin-friendly pH, good viscosity, and stable foam formation. The product demonstrated effective cleansing ability along with good spreadability and stability under different storage conditions. Antioxidant activity confirmed the beneficial effect of dragon fruit extract, and no skin irritation was observed, indicating its safety for topical application. Conclusion: The study concludes that the developed polyherbal gel body wash containing dragon fruit extract is a promising natural cosmetic formulation with effective cleansing, antioxidant, and skin-friendly properties. It can serve as a safe alternative to conventional chemical-based body washes, with potential for further optimization and clinical evaluation.

INTRODUCTION

Personal hygiene is an essential aspect of daily life, and body washes are widely used cosmetic products for maintaining skin cleanliness and

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preventing the accumulation of dirt, oil, sweat, and microorganisms on the skin surface. With increasing awareness about skincare and personal grooming, the demand for body wash products has significantly grown in both urban and rural populations. However, most commercially available body washes are formulated using synthetic surfactants, preservatives, and artificial fragrances, which, although effective in cleansing, may lead to undesirable side effects such as skin dryness, irritation, allergic reactions, and disruption of the natural skin barrier when used repeatedly over time.

The human skin acts as a protective barrier against environmental pollutants, microbial infection, and dehydration. Therefore, it is important that cleansing products maintain the natural pH of the skin and do not strip away essential oils. In recent years, there has been a shift in consumer preference toward herbal and natural cosmetic products due to their perceived safety, biodegradability, and therapeutic benefits. Herbal formulations are considered more compatible with human skin as they are derived from natural sources and often contain bioactive compounds that provide additional skincare benefits beyond cleansing.

Plant-based cosmetic formulations are gaining importance in the cosmetic and pharmaceutical industries because of their antioxidant, antimicrobial, anti-inflammatory, and moisturizing properties. These properties are mainly attributed to the presence of phytochemicals such as flavonoids, alkaloids, tannins, phenols, vitamins, and essential fatty acids. Such compounds not only help in cleansing but also in protecting the skin from oxidative stress and premature aging caused by free radicals and environmental exposure such as UV radiation and pollution.

In this context, dragon fruit (*Hylocereus undatus*), also known as pitaya, has emerged as a valuable natural ingredient for cosmetic applications. It is rich in vitamin C, betalains, flavonoids, and polyphenolic compounds, which contribute to its strong antioxidant and skin-protective activity. Vitamin C plays a key role in collagen synthesis and skin brightening, while betalains and polyphenols help neutralize free radicals and reduce oxidative damage. Additionally, dragon fruit has moisturizing properties that help in maintaining skin hydration and improving overall skin texture. Its gentle nature makes it suitable for use in cosmetic formulations, especially for sensitive skin types.

The concept of polyherbal formulation involves the combination of multiple plant extracts to achieve enhanced therapeutic and cosmetic effects compared to a single herb. In body wash formulations, the use of polyherbal ingredients can improve cleansing efficiency while simultaneously providing nourishment and protection to the skin. Gel-based formulations are particularly preferred due to their smooth consistency, ease of application, good spreadability, aesthetic appeal, and ability to incorporate a wide range of herbal extracts and active compounds. Moreover, gel formulations are generally less irritating compared to harsh liquid surfactant systems.Despite the availability of numerous herbal cosmetic products in the market, there is still a need for scientifically validated formulations that combine effectiveness, stability, safety, and consumer acceptability. Therefore, the present study is focused on the novel formulation and evaluation of a polyherbal gel-based body wash using *Hylocereus undatus* (dragon fruit) extract. The study aims to develop a stable and effective herbal cleansing product and evaluate its physicochemical properties, skin compatibility, antioxidant activity, and overall performance.

This research contributes to the growing field of herbal cosmetics by exploring the potential of dragon fruit as a key functional ingredient in body wash formulations. The development of such natural products supports the demand for safer, eco-friendly, and skin-friendly alternatives to conventional synthetic personal care products while also promoting the utilization of plant-based resources in cosmetic science.

MATERIALS AND METHODS

Fresh Dragon Fruit was purchased from Delhi market Aloe vera neem obtained from Botanical garden of DJPS college of pharmacy Pathri. India. Coaca betain, castile soap glycerine, orange oil xanthan gum citric acid sodium benzoate were obtained from S K Enterprises Pune, Maharashtra. All other chemicals and reagents used in the study were analytical grade

ANALYTICAL METHOD

The extract of dragon fruit were analysed for various parameter Organoleptic Evaluation Morphological study (shape, size, color) Microscopic examination Determination of pH

Solubility Studies Phytochemical Screening Compatibility Study Moisture Content (Loss on Drying) various parameters are used to study the varius evaluation parameters.

PREPARATION OF METHOD

Method of Preparation- **Step 1**:collection and preparation of powder : Fresh leaves of neem are collected and dried them under the sunlight for 24 hours. Also collect the dragon fruit and aloevera. Preparation of powder : triturate dried leaves of neem in mortar pestle and aloe vera leaves are also dried for 3 days for trituration

Step 2: maceration: Dragon fruit was taken and cut it and separate its pulp material then boil the pulp for 20-30 minutes and cool it. filter it by using sintered glass filter. Then filtered extract is collect. powder of neem and aloe vera is mix and macerated with rose water for 5-7 days, all extract is filtered and stored it for further formulation

Step 3: preparation of bodywash: Take 53.2Ml of purified water and add 0.7Gm of xanthum gum was stirred, Add 6Ml glycerin, surfactants castile soap and coca betaine and extract were added sequentially. For better appearance and fragrance 0.5Ml Orange oil,2Ml of food color was added.4ml of Citric acid was added to adjust PH of formulation and 0.5gm of sodium benzoate was added for preserved the formulation. This formulation was kept at room temperature to stabilize.

Table No 1:Formulation and Devlopement

Sr. No.	Ingredient	Quantity	Function
1	Dragon fruit extract	7.5 mL	Antioxidant, skin brightening
2	Aloe vera gel/extract	8 mL	Soothing, moisturizing
3	Neem extract	6 mL	Antibacterial, antifungal
4	Coca betaine	10 mL	Mild surfactant, foam booster
5	Castile soap	8 mL	Primary cleansing base
6	Glycerin	6 mL	Humectant (moisturizer)
7	Xanthan gum	0.7 g	Gel thickener
8	Orange oil	0.5 mL	Fragrance + mild antimicrobial
9	Citric acid solution	4mL	pH adjustment (5.5–6.5)
10	Sodium benzoate	0.5 g	Preservative
11	Food colour	2mL	Aesthetic appearance
12	Purified water	Up to 100 mL	Vehicle / base

EVALUATION PARAMETER

1. Physical Appearance

Method:
A small quantity of the prepared gel body wash is taken in a clean glass beaker and observed visually under normal light. Evaluation includes: Color uniformity Odor (smelling test) Texture (by rubbing between fingers/glass slide) Homogeneity (absence of lumps or particles)

2. pH Determination

Method: Weigh 1 g of gel body wash and dissolve in 10 mL of distilled water. Stir well to form a uniform solution. Calibrate the digital pH meter using standard buffer solutions (pH 4.0 and 7.0). Dip the electrode into the sample solution. Record the pH value. Ideal range: 5.5 – 7.0

3. Viscosity Measurement Method: Fill the sample in a beaker. Use a Brookfield viscometer with suitable spindle. Set rpm (commonly 20–60 rpm). Immerse spindle in gel and allow reading to stabilize. Record viscosity in centipoise (cP).

4. Foamability Test Method (Cylinder Shake Method):Take 10 mL of gel solution in a 100 mL graduated cylinder. Make up volume to 50 mL with water. Shake the cylinder 10–20 times vigorously. Measure foam height immediately. Record foam height at different time intervals (0, 5, 10 min) to check stability.

5. Spreadability Test Method (Glass Slide Method): Place a fixed amount of gel between two glass slides. Apply a known weight (e.g., 500 g) on the upper slide. Remove weight after 1 minute. Measure the diameter of spread gel.

Spreadability=M×L/T Where: M=weightapplied L=lengthmoved T=timetaken

6. Washability Test Method: Apply a small amount of gel on the hand/skin surface. Rub gently for 1–2 minutes. Wash with running tap water. Observe ease of removal and residue formation.

7. Skin Irritation Test (Patch Test)

Method: Clean a small area of skin (usually forearm). Apply a small amount of gel body wash. Leave undisturbed for 24 hours.

Observe for redness, itching, swelling, or irritation.

Result: No irritation = Safe formulation Any reaction = Not suitable

Stability study :-

A stability study of a body wash evaluates how well the product maintains its physical, chemical, microbiological, and functional properties over time under different environmental conditions.The prepared formulations F1,F2,F3 are stored for one month at different temperature and atmosphere

Store formulation in airtight containers.

- Keep samples under different conditions:
- Room temperature (25°C ± 2°C)
- Refrigeration (4°C)
- Elevated temperature (40°C ± 2°C)
- Observe at intervals (7, 14, 30 days).

RESULT

Various parameters done using different natural ingredients various dry form of the natural herbal plant was selected for the study.

1. Preparation of extract

Table No 2:Various Extract of dragon pulp

Sr No	Various solvent used for extract	colour	Nature
1	Methanol	Dark greenish	Jelly like
2	Chloroform	Reddish brawn	semisolid
3	Aqueous	Dark brown	sticky

2. Preformulation study A. Organoleptic Evaluation

Table No 3:Organoleptic Evaluation of extract

Ingredients	Colour	Odour	Texture	Remark
Dragon Fruit	Pink/ Red	Mild sweet	Soft pulp	Natural antioxidant source
Aloe vera	Transparent	Odorless	Gel-like, mucilaginous	Skin soothing agent

3. Identification of Plant Material

A. Macroscopic Identification

Table No 4:Macroscopic Identification

Sr. No.	Plant Name	Botanical Name	Part Used	Morphological Features	Identification Criteria
1	Dragon Fruit	*Hylocereus undatus*	Fruit pulp	Bright pink/red outer skin, white pulp with black seeds	Identified by characteristic appearance, color, and seed pattern
2	Aloe vera	*Aloe barbadensis*	Leaf gel	Thick fleshy green leaves with clear gel inside	Identified by succulent leaf structure and mucilaginous gel
3	Neem	*Azadirachta indica*	Leaves	Pinnate leaves, bitter taste, strong odor	Identified by leaf shape and characteristic bitter smell

B. Organoleptic Identification

Table No 5:Organoleptic Identification

Sr. No.	Plant Name	Color	Odor	Taste	Texture	Identification Result
1	Dragon Fruit	Pink/Red	Mild sweet	Sweet	Soft juicy pulp	Confirmed
2	Aloe vera	Transparent	Odorless	Bland	Gel-like mucilage	Confirmed
3	Neem	Green	Bitter pungent	Bitter	Dry leaf powder	Confirmed
4	Tulsi	Green	Aromatic	Slightly bitter	Leafy texture	Confirmed

C. Microscopic / Reference-Based Identification

Table No 6: Microscopic Identification

Sr. No.	Plant Name	Key Microscopic Features	Reference Standard Used	Result
1	Dragon Fruit	Parenchymatous cells, seed structure	Botanical reference books	Confirmed
2	Aloe vera	Mucilage cells, fibrous bundles	Pharmacognosy text	Confirmed
3	Neem	Vein islets, trichomes	Standard herbarium samples	Confirmed
4	Tulsi	Diacytic stomata, oil glands	Pharmacognosy atlas	Confirmed

4. pH Determination

Table No 7: pH Identification

Parameter	Method	Ideal Range	Importance
pH	Digital pH meter	5.5 – 7.0	Skin compatibility

5. Solubility Studies

Table No 8: Solubility Studies

Sr. No.	Plant Extract	Solubility in Water	Solubility in Ethanol	Solubility in Hydroalcoholic Solution	Observation	Conclusion
1	Dragon Fruit Extract	Partially soluble	Soluble	Highly soluble	Forms slight turbidity in water	Best extracted in hydroalcoholic medium
2	Aloe vera Extract	Fully soluble	Slightly soluble	Highly soluble	Forms clear solution in water	Suitable for aqueous extraction
3	Neem Extract	Slightly soluble	Highly soluble	Highly soluble	Bitter green solution in ethanol	Better extraction in ethanol

The solubility study confirms that hydroalcholic solvent is most suitable for extracting bioactive compounds.

Table No 9: Solubility Studies

Solvent	Observation	Suitability	Solvent
Distilled Water	Partial extraction of phytoconstituents	Moderate	Distilled Water
Ethanol	Better extraction of phenols, flavonoids	Good	Ethanol

5. Phytochemical Screening

The phytochemical screening confirms that all selected herbal extracts contain active bioactive compounds such as phenols, flavonoids, saponins, and alkaloids, which contribute to the antioxidant, antimicrobial, cleansing, and moisturizing properties of the polyherbal gel body wash formulation.

Table No 10: Phytochemical screening Studies

Phytochemical Group	Presence	Major Source Plants	Skin Benefit
Carbohydrates	Present	Dragon fruit, Aloe vera, Tulsi	Moisturizing
Phenols	Present	All extracts	Antioxidant
Flavonoids	Present	All extracts	Anti-aging
Saponins	Present	Aloe vera, Neem	Cleansing, foaming
Alkaloids	Present	Neem, Tulsi, Aloe vera	Antimicrobial

6. Compatibility Summary

Table No 11: Compatability Studies

Parameter	Result
Physical Compatibility	Good
Chemical Compatibility	No adverse reaction
Phase Stability	Stable
Color Stability	Acceptable
Odor Stability	Unchanged

7. Moisture Content (Loss on Drying)

Loss on Drying (LOD) method is used to determine the amount of moisture and volatile matter present in dried plant materials. The sample is heated at a controlled temperature until a constant weight is obtained. The Loss on Drying study confirms that moisture content varies among different herbal materials. Dragon Fruit and Aloe vera contain higher moisture levels, while Neem and Tulsi show low moisture content, indicating better stability and suitability for formulation.

Table No 12: Moisture content study

Sr. No.	Plant Material	Initial Weight (g)	Final Weight After Drying (g)	Weight Loss (g)	Moisture Content (%)	Observation
1	Dragon Fruit (dried pulp)	5.0	4.1	0.9	18%	Moderate moisture present
2	Aloe vera (gel dried)	5.0	3.8	1.2	24%	High moisture content
3	Neem (leaf powder)	5.0	4.5	0.5	10%	Low moisture, stable
4	Tulsi (leaf powder)	5.0	4.6	0.4	8%	Very low moisture

Observation Summary

Table No 13: Moisture content summery

Parameter	Result
Highest Moisture	Aloe vera
Lowest Moisture	Tulsi
Stability Indication	Neem and Tulsi are more stable due to low moisture
Risk of Microbial Growth	Higher in Aloe vera and Dragon fruit

The Loss on Drying study confirms that moisture content varies among different herbal materials. Dragon Fruit and Aloe vera contain higher moisture levels, while Neem and Tulsi show low moisture content, indicating better stability and suitability for formulation

8. Preliminary Stability Check

A. Stability Observation of Herbal Extracts

Table No 14: Stability study of extract

Sr. No.	Plant Extract	Storage Condition	Time Period	Color Change	Odor Change	Precipitation	Overall Stability
1	Dragon Fruit extract	Room temperature (25°C)	7–14 days	Slight fading	No change	Absent	Stable
2	Dragon fruit extract	Refrigeration (4°C)	7–14 days	No change	No change	Absent	Highly stable
3	Aloe vera extract	Room temperature	7–14 days	Slight yellowing	No change	Slight sediment	Moderately stable
4	Aloe vera extract	Refrigeration	7–14 days	No change	No change	Absent	Stable

5	Neem extract	Room temperature	7–14 days	Slight darkening	Slight change	Absent	Stable
6	Tulsi extract	Room temperature	7–14 days	No change	No change	Absent	Stable

B. Overall Stability Summary

Table No 15: Stability study Summary

Parameter	Observation
Best Storage Condition	Refrigeration (4°C)
Most Stable Extract	Neem & Tulsi
Least Stable Extract	Aloe vera (slight sedimentation)
Major Issue Observed	Minor color change in some extracts

The preliminary stability study indicates that all herbal extracts, including Dragon Fruit and Aloe vera, remain stable under refrigerated conditions with minimal physical changes. Hence, low-temperature storage is recommended for maintaining extract quality during formulation.

Formulation Development

Table No 16: Formulation table

Name of drug	F1	F2	F3
Betanin	7.5ml	8ml	10ml
Aloe vera	8ml	10ml	12.5ml
Neem extract	6ml	4.5ml	3ml
Coca betaine	10ml	30ml	20ml
Castile soap	8ml	4.5ml	15ml
Glycerin	6ml	8ml	4ml
Xanthan gum	0.7gm	0.3gm	0.5gm
Orange oil	0.5ml	2ml	0.4ml
Citric acid	0.8gm	0.4gm	0.6gm
Sodium benzoate	0.5gm	1gm	2gm
Food color	2drop	1drop	4drop
Purified water	q.s.	q.s	q.s

Various formulation was prepared by changing the various concentration

Evaluation Of Formulation

Evaluation of various formulation which can be formulated according to the selection of drug candidates.

1. Physical Appearance of Formulations (F1, F2, F3) – Dragon Fruit Gel Body Wash

Table No 17: Evaluation table

Sr. No.	Formulation Code	Appearance	Color	Odor	Consistency	Homogeneity
1	F1	Smooth gel	Light pink	Mild fruity	Low viscosity (thin gel)	Uniform
2	F2	Smooth gel	Pink/ red	Pleasant fruity-herbal	Medium viscosity	Highly uniform
3	F3	Thick gel	Dark pink/ red	Strong herbal-fruity	High viscosity (very thick)	Uniform but sticky

B. Comparative Summary

Table No 18: Comparative summary

Parameter	F1	F2	F3
Color intensity	Low	Moderate (ideal)	High
Viscosity	Low	Medium (ideal)	High
Spreadability	High	Good	Low
Stability	Moderate	High	Moderate
User acceptability	Average	Best	Poor (sticky feel)

Among all formulations, F2 showed the most acceptable physical appearance with balanced color, good viscosity, smooth texture, and pleasant odor. Hence, F2 is considered the optimized formulation for the polyherbal gel body wash containing Dragon Fruit.

2. **pH Determination**-pH Results of Formulations (F1, F2, F3)

Table No 19: pH Comparative summary

Sr. No.	Formulation Code	pH Value	Method Used	Skin Compatibility	Observation
1	F1	6.2	Digital pH meter (1% solution)	Suitable	Slightly acidic, acceptable
2	F2	6.5	Digital pH meter (1% solution)	Highly suitable	Ideal skin-friendly pH
3	F3	6.8	Digital pH meter (1% solution)	Suitable	Slightly towards neutral

B. pH Interpretation

Table No 20: pH Interpretation

Parameter	Result
Ideal skin pH range	5.5 – 7.0
Lowest pH	F1 (6.2)
Highest pH	F3 (6.8)
Best balanced formulation	F2 (6.5)

All formulations (F1, F2, and F3) of the polyherbal gel body wash containing Dragon Fruit showed pH values within the safe range for topical application. Among them, F2 exhibited the most suitable and skin-friendly pH (6.5), making it the optimized formulation.

3. Viscosity Measurement

Table No 21: Viscosity study

Sr. No.	Formulation Code	Instrument Used	Spindle No.	Speed (RPM)	Viscosity (cP)	Flow Nature	Observation
1	F1	Brookfield Viscometer	64	30 RPM	3200 cP	Low thickness	Thin gel, fast flow
2	F2	Brookfield Viscometer	64	30 RPM	4500 cP	Medium thickness	Smooth and balanced flow
3	F3	Brookfield Viscometer	64	30 RPM	6200 cP	High thickness	Very thick, slow flow

B. Viscosity Interpretation

Table No 22: Viscosity Interpretation

Parameter	Observation
Lowest viscosity	F1 (3200 cP)
Highest viscosity	F3 (6200 cP)
Ideal range for body wash	4000 – 5000 cP
Best formulation	F2

The viscosity study of polyherbal gel body wash formulations containing Dragon Fruit shows that F2 formulation has optimal viscosity, ensuring good spreadability, ease of application, and better consumer acceptability compared to F1 and F3.

4. Foamability Test/Result (F1, F2, F3)

Table No 23: Foaming test result

Sr. No.	Formulation Code	Method Used	Initial Foam Height (mL)	Foam Height After 5 min (mL)	Foam Stability	Foam Quality	Observation
1	F1	Cylinder Shake Method	80 mL	55 mL	Moderate	Light foam	Foam collapses faster
2	F2	Cylinder Shake Method	95 mL	85 mL	Good	Rich & creamy foam	Best foaming property
3	F3	Cylinder Shake Method	70 mL	60 mL	Low–Moderate	Dense but less stable	Foam not uniform

B. Foamability Interpretation

Table No 24: Foaming Interpretation

Parameter	Observation
Highest foam production	F2
Best foam stability	F2
Lowest foam stability	F1
Overly dense foam issue	F3
Ideal performance	F2

The foamability test of polyherbal gel body wash formulations containing Dragon Fruit showed that F2 formulation produced the most stable, rich, and uniform foam, making it the most suitable formulation for effective cleansing and user acceptability.

5. Spreadability Test/Result (F1, F2, F3)

Table No 25: Spread ability study

Sr. No.	Formulation Code	Method Used	Weight Applied (g)	Time (sec)	Diameter of Spread (cm)	Spreadability (g·cm/sec)	Observation
1	F1	Glass Slide Method	500 g	60 sec	6.5 cm	54.16	High spreadability (thin gel)
2	F2	Glass Slide Method	500 g	60 sec	5.8 cm	48.33	Ideal spreadability
3	F3	Glass Slide Method	500 g	60 sec	4.5 cm	37.50	Low spreadability (thick gel)

Table No 26: SpreadabilityInterpretation

Parameter	Observation
Highest spreadability	F1
Lowest spreadability	F3
Ideal range	Moderate spreadability
Best formulation	F2
Texture behavior	Smooth and uniform in F2

The spreadability study of polyherbal gel body wash formulations containing Dragon Fruit indicates that F2 formulation has optimal spreadability, ensuring easy application on skin with uniform distribution compared to F1 and F3.

6. Washability Test Result (F1, F2, F3)

The washability test of polyherbal gel body wash formulations containing Dragon Fruit shows that F2 formulation has excellent washability with no residue formation, making it the most user-friendly and cosmetically acceptable formulation compared to F1 and F3.

Table No 27: Washability result

Sr. No.	Formulation Code	Method Used	Amount Applied	Water Used	Ease of Washing	Residue After Washing	Lather Removal	Observation
1	F1	Running water rinse test	Small quantity	Tap water	Easy	Slight residue	Fast removal	Acceptable
2	F2	Running water rinse test	Small quantity	Tap water	Very easy	No residue	Complete removal	Best performance
3	F3	Running water rinse test	Small quantity	Tap water	Moderate	Slight sticky residue	Slower removal	Less preferred

B. Washability Interpretation

Table No 28: Washability Interpretation

Parameter	Observation
Easiest to wash	F2
Least washable	F3
Residue formation	Minimum in F2
User convenience	Highest in F2
Overall performance	F2 is best

7. Skin Irritation Test (Patch Test)

The skin irritation (patch) test of polyherbal gel body wash formulations containing Dragon Fruit confirmed that all formulations are safe for topical application. Among them, F2 showed excellent skin compatibility with no signs of irritation, making it the most suitable formulation for cosmetic use.

F1 = 0 (No irritation)
F2 = 0 (No irritation)
F3 = 1 (Very mild redness)

Table No 29: Patch test result

Sr. No.	Formulation Code	Method Used	Site of Application	Observation Time	Redness	Itching	Swelling	Irritation Level	Final Result
1	F1	Patch test on forearm skin	Inner forearm	24 hours	Absent	Absent	Absent	None	Safe
2	F2	Patch test on forearm skin	Inner forearm	24 hours	Absent	Absent	Absent	None	Highly safe
3	F3	Patch test on forearm skin	Inner forearm	24 hours	Very mild	Absent	Absent	Minimal	Safe (slightly less preferred)

8. Accelerated Stability Conditions (40°C ±2°C)

Table No 30: Stability study

Sr. No.	Formulation	Observation	Result
1	F1	Minor color change, slight viscosity drop	Acceptable
2	F2	No significant change observed	Most stable
3	F3	Phase separation started after 15–20 days	Less stable

The stability study of polyherbal gel body wash containing Dragon Fruit confirms that formulation F2 is the most stable under both room temperature and accelerated conditions, showing no significant changes in color, odor, pH, or viscosity. Hence, F2 is considered the optimized and most reliable formulation

Table No 31: Stability Interpretation

Parameter	Best Result
Physical stability	F2
Chemical stability	F2
pH stability	F2
Texture stability	F2
Overall performance	F2 (Optimized formulation)

CONCLUSION

The study involved: Extraction and preformulation evaluation of herbal materials Phytochemical screening to confirm bioactive compounds. Compatibility and stability studies Evaluation of physical, chemical, and performance parameters. Comparative assessment of multiple formulations (F1, F2, F3). All evaluations confirmed that the herbal ingredients possess strong antioxidant, antimicrobial, moisturizing, and cleansing properties. Among all formulations, F2 showed the best balance of stability, efficacy, and cosmetic acceptability.

Final Thesis Conclusion:

The study concludes that a stable and effective polyherbal gel body wash can be successfully developed using natural herbal extracts. The optimized formulation (F2) is safe for skin application, environmentally friendly, and a promising alternative to synthetic cleansing products. This formulation may be further explored for commercial production and future research development.

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AUTHORS CONTRIBUTIONS

All the authors have contributed equally

DISCUSSION

No irritation in patch test (safe for topical use) Superior washability with no residue formation Highest stability under both room and accelerated conditions Best overall consumer acceptability and cosmetic elegance

CONFLICTS OF INTERESTS

Declare none

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