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Revitalize your skin: Crafting and evaluating a polyherbal lotion bar with *Carica papaya, Psidium guajava,* and *Camellia sinensis*

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Abstract
This study presents the formulation and evaluation of a natural lotion bar incorporating *Carica papaya*, *Psidium guajava*, and *Camellia sinensis*.Rich in vitamins, antioxidants, and anti-inflammatory compounds, these botanical ingredients offer significant skincare benefits. The lotion bar was designed to enhance skin hydration, texture, and overall appearance. Phytochemical evaluation, Anti-oxidant study and skin irritation study confirmed its efficacy and minimal adverse reactions, highlighting its potential as a natural skincare solution. The innovative lotion bar containing papaya, green tea, and guava leaf extracts presents a promising natural skincare solution. The product not only offers the benefits of its potent botanical ingredients but also satisfies consumer needs for ecofriendly and sustainable skin care products. Prospective research should focus on long-term efficacy and potential dermatological applications, exploring further the vast benefits of these natural ingredients in skincare formulations.

Keywords: Skin care, Eco friendly, DPPH, Anti oxidant, Skın ırrıtatıon test, Muller-Hinton Agar medium

Introduction
Lotion bars have their roots in ancient skincare practices, where natural fats and oils like olive oil, beeswax, and shea butter were used for skin protection and healing. These traditional remedies were passed down through generations across various cultures such as the Egyptians, Greeks, and Romans, who valued natural remedies for their skinsoothing properties. Solid block of lotion used for moisturising skin. It is easy to apply as needed because it is made of natural substances that remain solid at room temperature but slightly melt when heated by the body. These products are innovative, solid moisturizers crafted from a blend of natural butters, oils, and waxes, designed to nourish and hydrate the skin without the need of water or preservatives [1]. A lotion bar is precisely what its name implies: a bar of lotion. It is a zero-waste solution for ordinary moisturizers found in plastic bottles. When you need to apply lotion, simply massage the bar of soap directly onto your skin rather than squeezing it out of a stiff and wasteful bottle. Their compact and portable form makes them an eco-friendly and zerowaste alternative to traditional liquid lotions, often packaged in minimal or biodegradable materials. To use a lotion bar, simply warm it between your hands or apply it directly to your skin, where your body heat will melt the rich ingredients, allowing for smooth and easy absorption. Oils, butters, and beeswax work together to seal in moisture rather than allowing it to escape known as transdermal water loss or TEWL [2]. Popular among those seeking natural skincare solutions, lotion bars provide a convenient, long-lasting, and effective way to maintain healthy, moisturized skin [1].
Emulsifying agents, nourishing agents, and oil phase chemicals were among the ingredients that were modified to create an ideal lotion bar composition. These Increase the moisturising property and fortify it against various pollutions. Papaya fruit has high content of antioxidants, Vitamin A, C and E that help to moisturize, nourish skin, anti-aging, treat skin rashes and have exfoliating property [3]. Guava leaves have antibacterial, antifungal activity. It tightens and lessens folds and creases [4]. Green tea contains Vitamin E that nourish and hydrate skin. It brightens, repairs and protect skin from UV rays [5]. Lotion bar has several advantages over liquid lotion like: No need of preservative, versatility, travel friendly, easy to use and no spills

or leaks, Targeted moisturization, non greasy, Economical, Multipurpose: Solid perfume or massage barand Travel friendly [6-7].

Materials

Carıca papaya

Carica papaya identified and authentified by Dr.Sereena K, Assistant Professor, Department of Botony,MES Kalladi college, Mannarkad and the extraction of Carica papaya is done by maceration

Camellia sinensis

Leaves collected from Wayandu prepared the herbarium. Tea leaves authentified by Dr.Sereena K, Assistant Professor, Department of Botony,MES Kalladi college,Mannarkad. Powder of tea leaves is extracted by maceration process with ethanol as the solvent

Psidium gujava

Leaves collected from thrissur and prepared the herbarium.Guava leaves identified and authorised by Dr.Sereena K, Assistant Professor, Department of Botony,MES Kalladi college,Mannarkad.Leaves dried and grinded in to powder.extraction done by using Soxhlet apparatus.

Beeswax

Beeswax procured from Swami enterprices,New Delhi

Shea butter

Shea butter procured from Vedaoils,Gurugram,Haryana

Sandal wood oil

Sandal wood oil purchased from Vedaoils,Gurugram,Haryana

DPPH

Procured from Sisco Research Laboratories Pvt. Ltd.

Methods

Table 1: Composition table of polyherbal lotion bar

Sl no	Ingredıents	FI	F2	F3	F4
1	*Carica papaya*	3.5ml	3.5ml	3.5ml	3.5ml
2	*Psidium guajava*	3ml	3ml	3ml	3ml
3	*Camellia sinensis*	2.5ml	2.5ml	2.5ml	2.5ml
4	Bees wax	36g	27g	30g	27g
5	Shea butter	27g	36g	30g	27g
6	Virgin coconut oil	27ml	27ml	30ml	36ml
7	Sodium benzoate	0.1g	0.1g	0.1g	0.1g
8	Sandal wood oil	qs	qs	qs	qs

Method of preparation

Formulations F1 to F4 were created by changing the concentrations of bases.Required quantity of bees wax and shea butter and virgin coconut oil is weighed and transferred into a 500 ml beaker. Then it's warmed in a water bath at 70°C. Add required amount of papaya extract, green tea leaves extract and guava leaves extract. Stirr continuously for few minutes. Add suitable preservative and perfume Stirr continuously. A rectangular silicone mould is taken, and the mixture was poured carefully into it. Keep aside for half an hour for setting. The prepared lotion bar was stored in room temperature [1, 8].

Evaluatıon of lotıon bar

a. Determination of physical parameters of lotion bar:

1. Organoleptic properties: The prepared polyherbal lotion bar was evaluated for its organoleptic properties like colour, odour and physical appearance [9-10].

2. Homogenisity test: Every products homogenity was asessed using touch and sight inspection [8-9].

3. pH test: pH determined by pH meter [8].

4. Spreadability: Clean the glass slides and let them dry. Place a small amount of lotion bar in the middle of one slide made of glass (Slide A). Put the second slide (Slide B) on top of the lotion bar on Slide A. Gently place the weight on top of Slide B. Start the stopwatch and allow the lotion bar to spread for a fixed time. Remove the weight and Slide B. Measure the diameter of the spread lotion bar on Slide A with a ruler. Repeat the process few times for consistency and calculate the average spread diameter [9].

5. Stability test: Physical stability test was conducted with six cooling and heating cycles between refrigerator temperatures 40°C ± 1°C,65%±% RH for twenty four hours. Then, evaluated uniformity,softness, and colour [10].

6. Determination of antimicrobial activity of optimised lotion bar: The anti-bacterial activity of lotion bar was evaluated against *Staphylococcus aureus* bacteria by agar well diffusion technique.Test lawn culture organism was prepared with Muller Hinton Agar(MHA-Hi media-1084) plates using sterile cotton swab and allowed to dry for 15 minutes.A sterile cork borer was used to create to wells on the agar,each 4mm deep. Test and control lotion bar was placed in each well. The plate was incubated at 37degree Celsius overnight and zone of inhbition was noted [11-12].

7. Determination of antioxidant activity of optimised lotion bar: 33 mg of DPPH dissolved in one liter of analytical grade methanol to create DPPH Solution,which was then stored in a dark amber coloured bottle.In seperate test tubes 1 ml formulation at varied concentrations (100,200,400,800 and 1000 microgram per milliliter) was taken.After adding 5ml of DPPH solution to each tube shakng it, the test tubes were immediately placed in the dark at 27^0C for 20 minutes.After the incubation the tubes were centrifuged for five minutes at 3000 rpm, and a UV Visible Spectrophotometer was used to measure the absorbance of supernatant liquid at 517 nm.Methanol was used as control solution to set zero.The percentage scavenging effect was computed [1].

8. Skin irritation Ptential test using developing Chick embryo: Collect and wash the chick egg. Incubate the egg at 37.5°C with proper humidity (about 50-60°C) until they reach the desired development stage. Carefully create a small window in the eggshell to expose the chorioallantoic membrane (CAM)Gently place the piece of lotion bar onto the CAM. Observe the CAM immediately after application and look for signs of irritation, such as hemorrhage, lysis (cell membrane damage), or coagulation (protein denaturation) [13].

Results

4.1 Preliminary phytochemical evaluation of Carica papaya extract

Table 2: Phyto chemical evaluation result of *Carica Papaya*

Sl. Number	Phytoconstituents	Test	Outcome
1	Saponin	Foam test	+
2	Flavanoids	Alkaline reagent test	+
3	Tannin	Ferric chloride test	+

4.2 Preliminary phytochemical evaluation of *Psidium guajava* extract

Table 3: Phyto chemical evaluation result of *Psidium guajava* extract

Sl. Number	Phytoconstituents	TEST	Outcome
1	Saponin	Foam	+
2	Flavanoids	Shinoda	+
3	Tannin	Ferric chloride	+
4	Alkaloids	Dragendorff's reagent and Mayer's	+
5	Amino acid	Million's	+

Preliminary phytochemical screning of *Camellia sinensis*

Table 4: Phyto chemical evaluation result of *Camellia sinensis*

Sl l. Number	Phytoconstituent	Test	Result
1	Alkaloids	Dragendorf's reagent and Mayer's test	+
2	Amino acid	Million's	+
3	Flavanoids	Shinoda	+
4	Tannins	Ferric chloride	+
5	Catechins	Matchstick test	+

Table 5: Evaluation of Lotion bar

Parameter	F1	F2	F3	F4
Colour	Light greenish yellow	Greenish yellow	Light yellowish green	Pale yellow
Odor	Softly woody	Softly woody	Softly woody	Softly woody
pH	5.61	5.72	5.71	5.18
Homogenity through touch	Regular & smooth	Regular & Smooth	Not smooth	Regular and hard
By Visual	Homogenous	Homogenous	Homogenous	Homogenous
Stability	No considerable change in case of odor, colour & shape	Slightly change in shape	Considerable change in shape	No considerable change in case of colour, odor & shape
Spreadability	Good	Good	Good	Good

Evaluation of Lotion Bar
Anti microbial activity of Psidium guajava extract

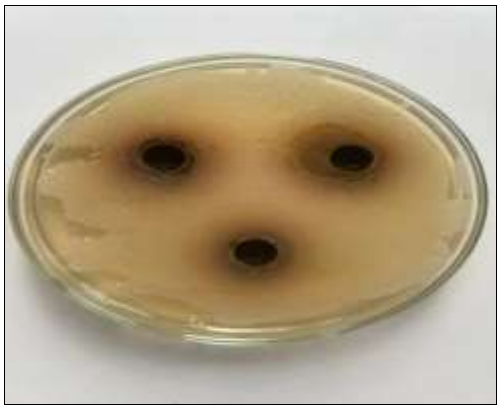

Fig 1: Extract with zone of inhibition 12 mm

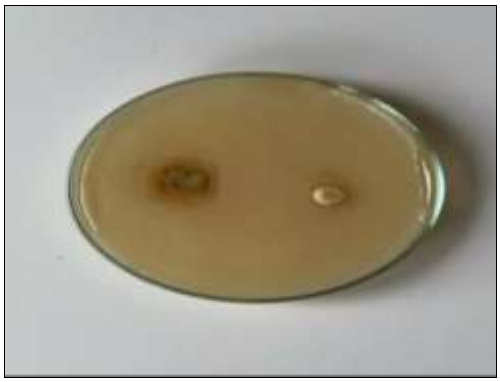

Fig 2: F1 showing zone of Inhibition of 10 mm,compared with control

Antibacterial activity of F1 formulation

Table 6: Determination of Antibacterial activity

Formula	Zone of ınhıbıtıon
Control	Not present
F1	10mm

Determination of Antioxidant activity

Table 7: Anti oxidant activity of Lotion bar

Tube	Content(µg/ml)	Absorbance AT 527 nm	% Of Antıoxıdant
Control	0	0.801	-
T1	100	0.202	74.78
T2	200	0.173	78.40
T3	400	0.098	87.76
T4	800	0.072	91.02
T5	1000	0.059	92.63

Fig 3: Anti oxidant activity of F1 formulation

Determination of skin irritation potential by using chick embryo

Fig 4: Skin irritation potential of F1 formulation

Table 8: Skin irritation potential results by using selected sample,control (negative) with 1%NaOH,control (positive) with 0.9%NaCI, 1% NaOH solution (Positive control) in CAM at various periods of time.

Product	Irritation response
Positive control	Irritant
Negative control	Non-irritant
F3	Non-irritant

0 min

0.5 min

2 min

5 min

0min

0.5 min

2 min

5 min

F1 Formulation

Discussion

The study contributed the formulation of natural poly herbal lotion bar incorporating *Carica papaya*, *Psidium guajava*, and *Camellia sinensis. Carica papaya* extract prepared by maceration technique by using ethanol as solvent. From the screening result of Carica papaya the ethanol extract of papaya fruit has secondary metabolites of flavonoids, tannins and saponins.*Camellia sinensis* leaves dried and powdered extracted with ethanol by using soxhlet appartus.Filtrate collected and evaporated by rotary evaporater. Preliminary screening of phytochemicals demonstrated the existence of Alkloids,Catechins,Flavanoids and tannins. *Psidium guajava* leaves collected and dried,extracted by maceration using ethanol,concentrated by rotary evaporater. *Psidium guajava* alcoholic extract revealed the existence of Saponin,alkaloid,flavanoids.Ethanolic extract of *Psidium guajava* showed inhibitory action against *Staphylococcus aureus* with 12mm zone of inhibition. Organoleptic properties: The lotion bar exhibits a pale greenish-yellow color and a softly woody odor, indicating a pleasing visual appeal and a pleasant fragrance that could enhance the overall sensory experience during application.

pH: With a pH value of 5.61, the lotion bar appears to be slightly acidic. It's important to consider the potential impact of pH on skin, as extreme values may cause irritation.

Homogeneity test: F1 and F2 were found to have the most consistency and good homogeneity, meeting the criteria for lotion bar preparations.

Spreadability test: The lotion bar's spreadability test results were within the range of except for F4, every formulation has a wide spread. Product with high spreadability requires no pressure resulting in a more unform distribution of the active ingredient in the skin and a more optimal effect.

Stability test: The lotion bar exhibited good stability under various temperature condition. No considerable changes were observed in terms of colour and fragrance for F1 and F4. There is a considerable change in consistency for F2 and F3.

The selected formulation was subjected to various evaluation studies like Anti-microbial activity, Anti-oxidant activity and skin irritation potential. The lotion bar F1 exhibited inhibitory activity against *Staphylococcus aureus* bacteria with zone of inhibition of 10mm, while the control did not show any inhibition. The anti-oxidant activity of Lotion bar tested by using DPPH, the scavenging activity of the product increases with increasing concentration from 100-1000 micro gram/ml. The result is comparable with Ascorbic acid. The skin irritation potential determined by using chick embryo showing that there is low potential for irritation, which supports the safety profile of the product making it suitable for use on sensitive skin without causing adverse reactions.

Conclusion

This research emphasizes the careful development of a lotion bar using natural ingredients selected for their skincare benefits. Formula 1 demonstrated excellent stability, pH balance, homogeneity, Spreadability, and safety. The antimicrobial and antioxidant properties of the ingredients suggest potential skincare benefits. Virgin coconut oil enhances the efficacy of the other ingredients, promoting healthy skin. In conclusion, the study supports natural skincare product development through rigorous testing to ensure safety and efficacy, highlighting the synergistic effects of the ingredients and the utilization of the polyherbal formula for daily use. Future scope of the polyherbal lotion bar includes clinical trials, sustainable packaging, scalability, market expansion, compatibility among ingredients, digital health integration, and regulatory approvals

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