

## Incorporation of Cocoa Extracts into Herbal Skin Care Products

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### KEY POINTS

**Question:** What are the key characteristics of the herbal cosmetics formulated using cocoa extracts, and how do they compare to synthetic alternatives in terms of physiochemical properties, skin-friendly attributes, and potential skincare benefits?

**Finding:** The study successfully formulated herbal lipsticks using cocoa extract, emphasizing the potential benefits of cocoa's high phenolic content, antioxidant properties, and mineral-rich composition (magnesium, theobromine, polyphenols). The research extended in crafting cocoa-based face packs with diverse ingredients for skin nourishment and radiance.

**Meaning:** The study underscores the potential of herbal cosmetics, particularly cocoa-derived lipsticks and face packs, in promoting skin health, addressing aesthetic and medicinal aspects, thereby advocating for continued exploration to meet the growing demand for safe and natural beauty alternatives.

### Abstract

**Importance:** Cosmetics play a crucial role in enhancing aesthetic appeal, and herbal formulations are gaining prominence due to

safety concerns associated with synthetic alternatives. This study focused on the importance of herbal cosmetics, particularly lipsticks, and explored the potential benefits of cocoa-based formulations for skin health.

**Objective:** The primary objective was to create herbal cosmetics utilizing cocoa extract, known for its antioxidant properties and skin-friendly minerals. The study aimed to develop formulations that address skin concerns while providing aesthetic benefits, emphasizing safety and compatibility with all skin types.

**Exposure:** The herbal cosmetic formulations were exposed to various physiochemical and stability evaluation tests.

**Main Outcome:** Research confirmed the commendable attributes of cocoa-infused herbal cosmetics, such as lipsticks and face packs, in color, stability, physiochemical properties, and skin-related aspects. These formulations demonstrated enduring resilience and outperformed mainstream counterparts in SPF, moisturization, and skin-friendliness, affirming their secure and advantageous potential in cosmetics.

**Result:** TN06 emerged as the optimal herbal lipstick with a bright red color, good spreadability, and a maximum SPF of 30. In contrast, TN11 exhibited suboptimal features. Among face packs, TNF03 with the highest cocoa powder concentration demonstrated superior characteristics, while TNF06 was considered less suitable.

**Conclusion & Relevance:** The conclusion emphasized the benefits of herbal lipsticks in revitalizing lip muscles, maintaining skin elasticity, and countering adverse effects of environmental factors. It also highlights the promising properties of herbal cosmetics, particularly lipsticks and face packs, in promoting skin health and addressing various concerns. The relevance lied in the growing acceptance of organic products due to their safety and fewer side effects compared to synthetic alternatives, indicating the need for further research in the field of herbal formulations in the cosmetics industry.

#### **Material and methods:**

##### **Selection of ingredients:**

Beeswax, castor oil, coconut oil, almond oil, food color, rose essential oil, cocoa beans, petroleum jelly, orange peel powder, cinnamon powder, coffee powder, sandal wood powder, rose petal powder, cocoa powder, wheat flour, and Multani matti were purchased from local market. The material used for the formulation was China dish, stirrer, petri dish, weighing balance, spatula, electric hot plate,

graduated beaker, pestle and mortar, distilled water, size reduction mill, grinder, and lipstick mold.<sup>1</sup>

##### **Formation of cocoa extract:**

A conical funnel-shaped column, housing 250g of cocoa nibs, underwent extraction for three hours at 73°C, employing 750g of water.<sup>2</sup>

##### **Formulation of lipstick:**

Lipstick formulation followed the procedure outlined by<sup>3</sup> with the creation of eleven formulations labeled TN01 to TN11 (Fig 3). In a china dish, castor oil was heated in a water bath, and beeswax was introduced, stirred until complete melting. Almond oil and coconut oil were gradually added with continuous stirring. Edible food colors were used for pigmentation, and a measured quantity of cocoa extract was incorporated, ensuring thorough homogeneity. TN01 to TN06 utilized raw cocoa extract, while TN07 to TN11 employed roasted cocoa extract. Rose essential oil, providing fragrance, was added in two to three drops. The detailed formulation of all herbal lipsticks from cocoa extract is enlisted in Table 1.

The resulting mixture (Fig 1) was poured into a lipstick mold and refrigerated for an hour. Once cooled and shaped into lipstick form, it was carefully removed and placed in an empty lipstick tube (Fig 2).

**Table 1: Formulation data of lipstick**

Ingredients	Castor oil (ml)	Beeswax (g)	Almond Oil (ml)	Coconut Oil (ml)	Rose oil (ml)	Food color (ml)	Petroleum jelly (g)	Raw cocoa extract (g)	Roasted cocoa extract (g)
Function	Humectant	Hardening Agent	Lubricant	Binder	Scent	Pigment	Stabilizer	Anti- oxidant	Anti- oxidant
TN01	6	3	1	2	1	1	NA	NA	NA
TN02	6	3	2	2	1	1	1	0.1	-
TN03	6	3	1	2	1	1	1	0.2	-
TN04	6	3	1	3	1	1	1	0.3	-
TN05	6	4	2	2	1	1	1	0.4	-
TN06	6	5	1	2	1	1	1	0.5	-
TN07	6	3	1	4	1	1	1	-	0.1
TN08	6	3	2	3	1	1	1	-	0.2
TN09	6	3	1	2	1	1	1	-	0.3
TN10	6	4	1	2	1	1	1	-	0.4
TN11	6	5	2	4	1	1	1	-	0.5

**Fig 1: Lipstick formulation from cocoa extract**



**Fig 2: Liquid formulation in a lipstick mold**



**Fig 3: Lipstick formulations (TN01 to TN11) developed in the research**

#### **Assessment of herbal lipstick**

Maintaining an unvarying quality for herbal lipstick is critical.<sup>4</sup> By taking this into consideration, the formulation of the lipstick was assessed using factors including melting point,<sup>5</sup> breaking point,<sup>6</sup> force of application,<sup>7</sup> surface irregularities.<sup>8</sup>

#### **Melting temperature assessment**

Knowing the melting point is crucial since it indicates the maximum amount of time something may be stored safely. The determination of the lipstick formulation's melting point was achieved through the capillary tube method.<sup>9</sup> The capillary was filled and placed within the capillary apparatus, and the product was observed as it gradually underwent melting.

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After certain duration, the subject of observation had completely melted. This procedure was repeated thrice, and the melting point ratio was recorded for each formulation.<sup>10</sup>

#### **Breaking point determination**

The strength of lipstick was assessed using the breaking point method. The lipstick was held horizontally, an inch from the edge of the support, in a socket. The weight was incrementally increased by a particular amount (10g) every 30 seconds, and the breaking point was defined as the weight at which something breaks.<sup>11</sup>

#### **Physical ability test**

It was for comparing the force that will act during application. The lipstick was

positioned at a 45° angle against a one-inch square section on a surface of coarse brown paper that was set on shadow graph balance. The pressure reading serves as a gauge for application force.<sup>12</sup>

### Tensile strength test

This test was done to find out how hard and durable the lipstick was. This method involved attaching the lipstick to loads with increasing stresses. The force at which lipstick broke was known as the breaking load point.<sup>13</sup>

### Thixotropicity test

This test revealed whether the base's viscosity was homogeneous. Penetrometer was the name of the device that was used to measure thixotropic nature.<sup>14</sup>

### Solubility test

The aim of the experiment was to assess the solubility of different formulations in various solvents.<sup>15</sup>

### Perfume stability

The fragrance was evaluated one month later to monitor the longevity of the aroma.<sup>16</sup>

### Physical evaluation

To maintain consistent standards for herbal lipstick, it is essential to subject the herbal lipstick formulations to evaluation (Table 2). In line with this, the assessment of herbal lipstick formulations encompassed various parameters such as melting points and breaking points,<sup>17</sup> thixotropic characteristics,<sup>18</sup> claim potency,<sup>19</sup> and surface irregularities.<sup>20</sup>

**Table 2: Evaluation of herbal lipstick**

Entry	Consideration	Color	Skin irritation	Melting point (°C)	Breaking point	Hardness (g)	Ring Diameter (cm)	Solubility
1	TN01	Pink	No	60-60.5	30	80	5	Chloroform
2	TN02	Orange	No	60-60.8	30.1	90	5.2	Chloroform
3	TN03	Pink	No	60-60.7	31.2	91	5.5	Chloroform
4	TN04	Pink	No	60-60.3	32	90.1	5.7	Chloroform
5	TN05	Red	No	60-60.9	33	97	5.5	Chloroform
6	TN06	Red	No	60-61.2	32.6	88	6	Chloroform
7	TN07	Red	No	61-62.2	31.9	105	7	Chloroform
8	TN08	Red	No	62-62.7	30.3	115	4.3	Chloroform
9	TN09	Pink	No	61-62.5	30.5	120	7.8	Chloroform
10	TN10	Pink	No	60-61.8	33.4	125	8	Chloroform
11	TN11	Pink	No	61-61.8	32.5	100	7.5	Chloroform

### Physiochemical evaluation

Cosmetic products whether makeup or skincare, must undergo evaluation based on physiochemical aspects (Table 3) to

ensure their safety for application on human skin and compliance with the standards of non-toxic cosmetics.<sup>21</sup>

**Table 3: Physiochemical evaluation of lipstick**

Parameters	SPF	pH	Perfume stability	Thixotropicity
TN01	10	6	++	9
TN02	15	6.3	++	9
TN03	18	6.5	++	9.2
TN04	20	6.7	++	9.5
TN05	25	6.2	++	9.9
TN06	30	6.1	++	9
TN07	15	6.7	++	8.9
TN08	18	6.3	++	9
TN09	20	6.2	++	9.7
TN10	25	6.1	++	9
TN11	26	6.9	++	9.7

### Formulation of Face pack:

Different formulations were created using various ratios of all ingredients known as TNF from TNF01 to TNF06 (Table 4). Using sieve #40, the precise amount of orange peel powder,<sup>22</sup> cinnamon powder,<sup>23</sup> coffee powder,<sup>24</sup> sandal wood powder,<sup>25</sup> rose petal powder,<sup>26</sup> cocoa

powder,<sup>27</sup> wheat flour,<sup>28</sup> and Multani matti<sup>29</sup> was measured and chopped into a fine powder.<sup>30</sup> The ingredients were uniformly blended through a systematic and sequential method. Subsequently, the finalized face packs were packed into self-sealing polyethylene containers and appropriately labeled.

**Table 4: Formulation data of face pack**

Entry	Ingredients	TNF01	TNF02	TNF03	TNF04	TNF05	TNF06
1	Cocoa powder (g)	NA	1	2	3	4	5
2	Orange peels powder (g)	1	0.1	0.1	0.1	0.2	0.2
3	Fuller earth Powder (g)	1	0.1	0.1	0.1	0.2	0.2
5	Sandal wood powder (g)	1	0.1	0.1	0.1	0.2	0.2
6	Rose petals powder (g)	1	0.1	0.1	0.1	0.2	0.2
7	Coffee powder (g)	1	0.1	0.1	0.1	0.1	0.2
8	Wheat flour (g)	1	0.1	0.1	0.1	0.1	0.1



**Fig 3: Face pack formulations (TNF01to TNF06) formulated in the research**

### Assessment of herbal face pack

#### Structural assessment:

The evaluation entailed assessing the herbal face pack for attributes such as



color, fragrance, appearance, texture, and other relevant factors. The external characteristics of the formulation were examined in accordance with the guidelines provided by.<sup>31</sup>

### Physical assessment:

Particle size was assessed using the sieve technique,<sup>32</sup> while the bulk density,<sup>33</sup> tapped density,<sup>34</sup> and angle of repose,<sup>35</sup> determined through the funnel method,<sup>36</sup> were employed to evaluate the powder flow properties of the mixed powder.<sup>37</sup>

### Firmness analysis:

The developed formulation underwent stability testing by being stored at different temperatures for a month.

Evaluation at various temperatures, including room temperature and 40°C, involved assessing physical parameters such as color, odor, pH, consistency, and texture.<sup>38</sup>

### Stability evaluation

The evaluation involved assessing the herbal face pack for attributes such as appearance,<sup>39</sup> texture,<sup>40</sup> color,<sup>41</sup> and more (Table 5). A month-long stability test was conducted by storing the prepared formulation at different temperatures.<sup>42</sup> The external characteristics of the formulation were evaluated following the methodology outlined.<sup>43</sup>

**Table 5:** Evaluation of herbal cocoa based face pack

Consideration	Color	Skin irritation	Smell	Application	External Glitches	pH	Appearance
TNF01	Brown	No	Fruity	Smooth	NA	6	Powdery
TNF02	Brown	No	Fruity	Smooth	NA	6.3	Powdery
TNF03	Brown	No	Chocolaty	Smooth	NA	6.5	Powdered
TNF04	Brown	No	Fruity	Smooth	NA	6.7	Powdery
TNF05	Brown	No	Floral	Smooth	NA	6.2	Powdered
TNF06	Brown	No	Sweet	Smooth	NA	6.1	Pulverized

### Physiochemical evaluation

The glass vials containing the formulation were assessed for physical attributes (Table 6) such as color, particle size, tapped density, angle of repose, aroma, pH, uniformity, and the

finish.<sup>44</sup> Additionally, they underwent storage at various temperatures, including 60°C and room temperature.<sup>45</sup>

**Table 6:** Physiochemical evaluation of facepack

Parameters	Particle size (mm)	Ash residue (%)	Tapped density (g/ml)	Angle of repose (°)
TNF01	20.5	3	0.80	14
TNF02	21	4	0.81	14
TNF03	21.4	4	0.83	15
TNF04	23	5	0.81	16
TNF05	19	6	0.82	15



## Discussion

Herbal lipsticks offer lip skin nourishment, addressing concerns like wrinkles, dryness, cracking, and lip folds. These lipsticks require minimal exfoliation, providing a cooling, relaxing, and soothing effect on the lips, enhancing their natural gloss quickly.<sup>46</sup>

The study underscores the exceptional qualities of herbal lipstick, emphasizing the growing acceptance of organic products due to their safety and reduced likelihood of adverse effects compared to additive-based alternatives. The SPF values of cocoa lipsticks range from 10 to 26, with corresponding pH values varying from 6 to 6.9. All products exhibit high perfume stability (++) , with thixotropicity values ranging from 8.9 to 9.9. Comparing these values with the specifications of market brands, it was observed that cocoa-based cosmetics were better in SPF and more suited to all skin types. However, the pH values are generally lower than what's indicated for Rivaj cosmetics and Becute cosmetics. Regarding skin irritancy, none cocoa products exhibit any level of irritancy (+). Hydration levels are consistently mild across all products. Pigmentation is either positive or strong for all products, and they all have a strong fragrance. Topical side

effects are observed in Becute cosmetics but not in others. Lastly, while slight greasiness is noted in all products, none have a non-greasy texture.<sup>47</sup>

Cocoa-based face packs, explored in this study, serve as rich sources of essential nutrients for maintaining healthy and radiant skin.<sup>48</sup> The formulations TNF01 to TNF06 are brown in color and exhibit no skin irritation. They offer various fragrances such as fruity, chocolaty, floral, and sweet with smooth application. The pH ranges from 6 to 6.7, angle of repose in range of 14-16°, particle size of 19-21.4 mm presenting a powdered or pulverized appearance. Additionally, the formulations demonstrate differences in untapped density, tapped density, ash residue, and angle of repose, indicating variations in their physical properties and formulation characteristics.<sup>49</sup>

## Conclusion

A herbal lipstick is designed to revitalize lip muscles, maintain skin elasticity, eliminate adhered dirt particles, and enhance blood circulation. The advantages of herbal-based cosmetics lie in their non-toxic composition, providing nourishment to the lips and aiding in the prevention of wrinkles, cracking, dryness, and folds. This lipstick exfoliates gently, delivering a soothing, calming, and cooling

effect while restoring the lips' natural shine within an optimal timeframe. Regular use of natural lip products improves lip texture and imparts an attractive color. Environmental factors, such as pollution and harsh climates, negatively impact the lips, but consistent application of herbal lipstick can counter these effects. By preserving the elasticity of lip cells, herbal lipsticks effectively control premature aging of the lips, managing issues like wrinkles and fine lines. This research indicates promising properties of herbal lipstick, prompting the need for further

studies to uncover additional cosmetic benefits. In contemporary times, natural remedies are widely accepted due to their safety and fewer side effects compared to chemical-based products. As the demand for herbal formulations increases in the global market, formulating herbal lipsticks with diverse natural nutrients proves to be an effective approach.

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## Tables

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TN02	15	6.3	++	9
TN03	18	6.5	++	9.2
TN04	20	6.7	++	9.5
TN05	25	6.2	++	9.9
TN06	30	6.1	++	9
TN07	15	6.7	++	8.9
TN08	18	6.3	++	9
TN09	20	6.2	++	9.7
TN10	25	6.1	++	9
TN11	26	6.9	++	9.7



**Table 4: Formulation data of face pack**

Entry	Ingredients	TNF01	TNF02	TNF03	TNF04	TNF05	TNF06
1	Cocoa powder (g)	NA	1	2	3	4	5
2	Orange peels powder (g)	1	0.1	0.1	0.1	0.2	0.2
3	Fuller earth Powder (g)	1	0.1	0.1	0.1	0.2	0.2
5	Sandal wood powder (g)	1	0.1	0.1	0.1	0.2	0.2
6	Rose petals powder (g)	1	0.1	0.1	0.1	0.2	0.2
7	Coffee powder (g)	1	0.1	0.1	0.1	0.1	0.2
8	Wheat flour (g)	1	0.1	0.1	0.1	0.1	0.1

**Table 5: Evaluation of herbal cocoa based face pack**

Consideration	Color	Skin irritation	Smell	Application	External Glitches	pH	Appearance
TNF01	Brown	No	Fruity	Smooth	NA	6	Powdery
TNF02	Brown	No	Fruity	Smooth	NA	6.3	Powdery
TNF03	Brown	No	Chocolaty	Smooth	NA	6.5	Powdered
TNF04	Brown	No	Fruity	Smooth	NA	6.7	Powdery
TNF05	Brown	No	Floral	Smooth	NA	6.2	Powdered
TNF06	Brown	No	Sweet	Smooth	NA	6.1	Pulverized

**Table 6: Physiochemical evaluation of facepack**

Parameters	Particle size (mm)	Ash residue (%)	Tapped density (g/ml)	Angle of repose (°)
TNF01	20.5	3	0.80	14
TNF02	21	4	0.81	14
TNF03	21.4	4	0.83	15
TNF04	23	5	0.81	16
TNF05	19	6	0.82	15
TNF06	20	7	0.84	14

## Figures



**Fig 1: Lipstick formulation from cocoa extract**



**Fig 2: Liquid formulation in a lipstick mold**



**Fig 3: Lipstick formulations (TN01to TN11) developed in the research**



**Fig 3: Face pack formulations (TNF01to TNF06) formulated in the research**