

# Formulation and Evaluation of Herbal Surma

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**Abstract:** Herbal surma (kohl) is a traditional eye cosmetic widely used for beautification and protection of the eyes. However, many commercially available formulations contain harmful heavy metals such as lead, posing serious health risks. The present study aims to formulate and evaluate a safe, herbal, and lead-free surma using natural ingredients including almond ash, Triphala (*Emblica officinalis*, *Terminalia chebula*, *Terminalia bellirica*), ghee, and zinc oxide. The formulation was prepared by controlled combustion of almonds to obtain fine carbon soot, followed by incorporation of Triphala powder, zinc oxide, and ghee to achieve a smooth consistency.

**Keywords:** Herbal surma, Kohl, Triphala, Almond ash, Eye cosmetic, Lead-free formulation, Herbal kajal.

## 1. Introduction

Due to growing knowledge of the negative effects of synthetic chemicals and heavy metals included in traditional cosmetic products, herbal cosmetics have attracted a lot of interest lately. [1] Among these, eye cosmetics like surma (kohl or kajal) are particularly important in traditional medical systems and cultural customs in Africa, the Middle East, and India. [2] Surma has been utilized for its medicinal and protective properties for the eyes in addition to its aesthetic qualities. [3] The Arabic word "Kahal" is the source of the word "kohl," and the Persian word "surma" refers to collyrium preparations applied to the eyes. [4] In the past, natural elements including plant extracts, oils, and soot from burning organic items were used to make surma. [5] These compositions were thought to have cooling, cleaning, antibacterial, and anti-inflammatory qualities, which made them advantageous for preserving eye health and avoiding infections. Kohl has been used historically from the time of ancient Egypt, when both men and women used it to shield their eyes from microbial illnesses, intense sunshine, and desert dust. According to Ayurveda, using Anjana (collyrium) on a daily basis is crucial for preserving ocular hygiene and enhancing vision. [6] Kajal was also made in traditional Indian homes using basic techniques like burning oil lamps and gathering soot, which was then combined with castor oil or ghee. Modern commercial surma products have prompted significant safety concerns despite their long-standing traditional use. As a result, the current study focuses on creating and assessing a natural herbal surma that is stable, safe, and effective. By bridging the gap between conventional wisdom and contemporary scientific validation, this study hopes to advance the creation of a dependable, environmentally friendly eye cosmetic that may be used on a daily basis.

## 2. Materials and Equipment

### Materials

The materials used in the formulation of herbal surma were selected based on their traditional use and pharmacological properties. All ingredients were of suitable pharmaceutical or herbal grade.

**Table 1: Materials Used in Herbal Surma Formulation**

Sr. No.	Material	Use / Function
1	Almond ash	Provides black color and smooth texture
2	Amla powder	Antioxidant and cooling agent
3	Haritaki powder	Anti-inflammatory and cleansing agent
4	Bibhitaki powder	Antimicrobial and protective agent
5	Ghee	Lubricating and soothing base
6	Zinc Oxide	Protective and antiseptic agent
7	Cotton	Used for filtration and ash collection

### Method of Preparation

The herbal surma was prepared using a traditional method with slight modifications to ensure uniformity and safety.[10-16]

1. Almonds were burned under controlled conditions to obtain fine black ash (almond soot).
2. Amla, haritaki, and bibhitaki were dried and powdered separately.
3. The powders were mixed in equal proportions to prepare Triphala powder.
4. Almond ash, Triphala powder, and zinc oxide were passed through a fine sieve (#80) to ensure uniform particle size.
5. All ingredients were weighed accurately using a digital balance.
6. The sieved powders were mixed thoroughly in a mortar and pestle to achieve uniform blending.
7. Ghee was added gradually and triturated until a smooth, homogeneous paste was obtained.
8. The prepared formulation was filtered through cotton to remove any coarse particles and impurities.
9. The final herbal surma was transferred into a clean, dry, and airtight container for storage.

**Table 2: Formulation Composition of Herbal Surma**

Sr. No.	Ingredient	Quantity	Function [36-40]
1	Almond ash	2 g	Provides black color and smooth texture
2	Amla powder	0.3 g	Antioxidant and cooling agent
3	Haritaki powder	0.3 g	Anti-inflammatory and cleansing agent
4	Bibhitaki powder	0.3 g	Antimicrobial and protective agent
5	Zinc Oxide	5 g	Protective and antiseptic agent
6	Ghee	q.s.	Lubricating base and binding agent
7	Cotton	q.s.	Used for filtration (not part of final product)

**Soot Preparation [17-21]**

1. **Cleaning:** Brass plate and diya were cleaned and dried; setup kept in draft-free area.
2. **Lamp Setup:** Mustard oil and cotton wick were used to produce a steady flame.
3. **Soot Collection:** Brass plate placed above flame (2–2.5 inch) for 4–6 hrs to collect soot.
4. **Harvesting:** Soot was scraped, filtered, and fine black powder collected.
5. **Storage:** Stored as powder or mixed with ghee; kept in airtight container.



*Fig. 1: Traditional Method of Kajal (Surma) Soot Collection*

**Evaluation Parameters[22-29]**


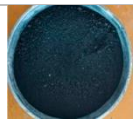



**Table No 3: Evaluation Parameters of Herbal Surma[30-35]**

Sr. No.	Parameter	Principle	Procedure[41-42]	Acceptance Criteria
1	Colour	Indicates purity and carbonization	Spread sample on white tile and observe in daylight	Uniform deep black colour
2	Odor	Detects rancidity or contamination	Smell sample after keeping in closed container	Mild, pleasant odor; no rancid smell
3	Texture	Determines smoothness and fineness	Rub between fingers and apply on skin	Smooth, soft, non-gritty
4	Homogeneity	Ensures uniform mixing	Visual inspection for lumps or aggregates	Uniform and lump-free
5	Particle Size	Affects irritation and application	Observe visually or under microscope	Fine and uniform particles
6	pH	Compatibility with tear fluid	1 g sample in 10 mL water, measure using pH meter	6.5 – 7.5
7	Spreadability	Ease of application	Place between glass slides, apply weight, measure spreading	Good spreading property

### 3.Results

The prepared herbal surma was evaluated for various physicochemical and safety parameters. The formulation exhibited satisfactory characteristics suitable for ocular application. The surma was found to be uniform black in color with a smooth and soft texture, indicating proper carbonization and fine particle size. The formulation showed good homogeneity without any lumps or coarse particles. The pH was found to be in the range of 6.8–7.0, which is close to the pH of tear fluid, suggesting its compatibility with the eye. The spreadability of the formulation was good, ensuring easy and uniform application. The irritancy test showed no signs of redness, itching, or inflammation, confirming that the formulation is safe and non-irritant. The washability test indicated that the product can be easily removed, which is desirable for cosmetic use.

**Table 4: Results Along with Images**

Sr. No.	Parameter	Observation / Result	Image
1	Colour	Uniform deep black color	
2	Texture	Smooth and soft, non-gritty	
3	Homogeneity	Uniform, no lumps present	
4	Particle Size	Fine particles, free from coarse matter	
5	pH	6.8 – 7.0 (near neutral)	
6	Spreadability	Good, spreads easily	
7	Irritancy	No redness or irritation observed	
8	Washability	Easily washable with water/soap	
9	Stability	No significant change during storage	

#### 4. Discussion

The herbal surma was successfully formulated using almond ash, Triphala, ghee, and zinc oxide. Almond ash provided a uniform black color and smooth texture, while Triphala contributed antioxidant, antimicrobial, and soothing properties. Ghee improved consistency, spreadability, and cooling effect. The formulation showed good homogeneity, fine particle size, and easy application. The pH was near neutral, indicating suitability for ocular use. No irritation was observed during testing, confirming safety. Stability studies showed no significant changes, indicating a stable formulation.

#### 5. Conclusion

The prepared herbal surma is a safe, effective, and lead-free alternative to conventional eye cosmetics. It showed good quality, stability, and non-irritant nature. The study supports the use of traditional Ayurvedic methods with scientific validation. However, further studies on sterility and clinical evaluation are recommended, and the product should be used externally only. The study focused on the preparation and evaluation of a herbal surma as a safe alternative to lead-containing commercial products. Almond ash served as a natural pigment, while Triphala enhanced therapeutic value. Ghee improved application properties, and zinc oxide provided protection. The formulation exhibited good physicochemical properties, safety, and stability, making it suitable for cosmetic use.

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