

GANDHAK DRUTI AND GANDHAK DRUTI CREAM: A COMPARATIVE ANALYSIS OF THEIR PHYSIOCHEMICAL AND ANTIMICROBIAL ACTIVITY

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ABSTRACT

Background- Ayurveda is an ancient science of life consisting of herbal and mineral formulas. Gandhaka Druti is a famous example narrated in the classical text of Rasashastra. This formulation is known for its benefits in treating skin diseases like Pama (Scabies) and Vicharchika (Eczema) and is used for external use. It is known for its excellent anti-inflammatory properties in kustha, kandu, twak vikaras etc. A special arrangement of mineral preparations to increase its efficacy and patient acceptance, this study focuses on the development of daily consumer products cream. The data will be assessed for its comparative physiochemical analysis and antimicrobial action of both the gandhak druti and gandhak druti cream on *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Candida albicans*. **Conclusion-** The result of this Research work will serve as effective quality tool for comparing effects of gandhak druti and gandhak druti cream. **Materials & Methods:** The raw materials and herbal ingredients were sourced from the Ch. Devi Lal College of Ayurveda Jagadhari 135001,

Haryana Pharmacy, and from the local market. The process began with the Sodhana (Purification) of Gandhaka, followed by the preparation of Trikatu and the formulation of Gandhaka Druti using the Varti method. Subsequently, after preparation of Gandhaka Druti, Gandhaka Druti Cream was developed by incorporating the formulation into a modern cosmetic base. Both of the preparations were pharmaceutically, analytically were studied and finally anti-microbial study was done.

KEYWORDS: *Rasashastra, Gandhaka Druti, Pama, Vicharchika, Varti, Gandhak Druti, Staphylococcus aureus, Pseudomonas aeruginosa, Candida albicans.*

INTRODUCTION

The number of Krimighna dravya is described in the ancient text. The word "Krimi" is compared to many types of bacteria, including many bacteria and fungi. They are unicellular, prokaryotes and have a simple cellular structure. Fungi are multicellular eukaryotes. They have a complex cellular structure.^[1] The Gandhaks mentioned in the classical text of Rasashastra are Keetnashak, Keetaghna, Krumighna, Pamari, Kushtari, Dadrughna. It shows the effects on various skin diseases. Therefore, this medicine was chosen for the review of antibiotics. Raw Gandhak can cause some diseases in the body as it contains foreign substances like Shilachurna and Visha. Therefore, to benefit more from Shuddha Gandhak, it is necessary to perform the process of 'gandha shodhan'.

AIMS AND OBJECTIVES

Aim

To evaluate antimicrobial activity of *Gandhak Druti and gandhak druti cream*.

Objectives

- To carry out purification of the raw drug *Gandhak*
- To prepare *Gandhak Druti*
- To prepare the *gandhak druti cream* from *gandhak druti*.
- To compare the physiochemical and Antimicrobial activity of prepared samples (*Gandhak Druti* and *Gandhak Druti cream*).

MATERIALS AND METHODS

Material

- *Gandhak*
- *Godugdha*
- *Goghrut*
- *Trikatu*
- *Til tail*

Instruments- Gas, Vessels, Cloth, Spoon, Thread.

Step 1 Gandhak shodhan

Reference - Ayurved Prakash

Material - Raw gandhak -100 gm

Godugdha- In required quantity

Goghrut- 100 gm.

Method

First *Godugdha* of normal temperature was taken in a vessel. After that, the vessel was covered with clean cotton cloth and tied at neck firmly. Then required *Goghruta* was taken in a steel vessel and heated on slow fire. When *Goghruta* completely melted then powdered *Gandhak* was added to it. After melting of *gandhak* in *goghruta*, mixture was poured in a vessel having *godugdha* through cotton cloth. The impurities like Stones and other physical structures remained on cloth and *Gandhak* get filtered in *godugdha*. During pouring of *Gandhak* in *Godugdha*, continuous stirring was done to avoid blockage of cloth due to the cooling of *Gandhak* over it. Then *Shudha Gandhak*^[4] was washed out with hot water till it gets free from *Goghruta* and *Godugdha*. **It is shown in Figure No.1.**



Figure 1: Gandhak shodhan.

This process was repeated for twice and every time fresh *Goghrut* and *Godugdha* was taken.^[5] *Gandhak* before *Shodhan* and after *Shodhan* is shown in Figure No. 2 and Figure No.3.



Figure 2: Gandhak before shodhan.



Figure 3: Gandhak after shodhan.

The quantity of *gandhak* obtained after *shodhan* is mentioned in Table No1.

Table 1: Shudha gandhak obtained after dhalan.

No. of Dhalan	Quantity of Gandhak Obtained	Quantity of Goghrot Required
1 st Dhalan	90 gm	100 gm
2 nd Dhalan	85 gm	90 gm
3 rd Dhalan	80 gm	85 gm

Step 2 Preparation of gandhak druti

Reference – *Rasa Ratna Samuchhaya* 3/27- 31

Material Gandhak – 80 gm Trikatu – 5 gm

Til tail – In required quantity.

Method

First mixture of *Trikatu* (1/16 of *Gandhak*) and *Gandhak Churna* was made in *Khalwa Yantra*. Then this mixture was sprinkled over cotton cloth, and was rolled gradually from one end to another end till *varti* forms. Then tied this *varti* with the help of thread and then it was immersed in a vessel containing *Til Tail*,^[6] as shown in **Figure No. 6**.



Figure 4: Preparation of varti.



Figure 5: Varti prepared.



Figure 6: Varti dipped in Oil.

Druti

After 3 hours *varti* was removed from tail. Then *varti* was held at one end with forceps and opposite end was ignited by fire. Then the drop of oil dribbling from burning ends was collected.^[7] This is shown in Figure No.7 and Figure No.8



Figure 7a & 7b: Then *Varti* was held at one end with Forceps and Opposite end was ignited by fire.



Figure 8(a & b): Prepared Gandhak Druti.

Physiochemical analysis of gandhak druti

Table 2: Physicochemical analysis of gandhak druti.

Test	Result
Appearance	Thick Black Syrupy Liquid Colour Black
Odour	Emitting obnoxious Sulphoraceous smell
Taste	Strong bitter
Ph	6.3
Loss on Drying	3.48
Loss on ignition	24.45
Solubility	4.6

Step 3: Preparation of Gandhaka Druti Cream: A pilot study was performed to develop the optimal formulation of *Gandhaka Druti* cream using *Gandhaka Druti* as an active ingredient in base ingredients of cream. The base of cream was selected following the instruction of Rule Number 169 of Drugs and Cosmetic Act 1940 and rules 1945. Then the formulation was adopted for making cream in three steps.

Table 1: Showing final selected formulation of gandhaka druti cream.

Name of Ingredient	Functions	Quantity (%)	Quantity (gm)
Gandhaka Druti	Active ingredient	25.00	250 gm
Ceto-steryl Alcohol	Emollient	2.00	20 gm
Cetyl Alcohol	Thickening agent	0.20	2 gm
Emulsifying Wax	Emulsifying agent	2.50	25 gm
Bees Wax	Thickening/ Emollient	0.80	8 gm
Paraffin's wax	Thickening	0.80	8 gm
Stearic Acid	Emulsifier	0.60	6 gm
Glycerol Monostearate	Pearlizing agent	1.50	15 gm
Borax	Anti-bacterial	0.20	2 gm
Iso-propyl Myristate	Emollient	3.00	30 gm
Tween-20	Emulsifier	0.50	5 gm

Phenoxy-Ethanol	Preservative	0.50	5gm
Water	-	62.40	624 gm
Fragrance	Fragrance	Qs.	Qs.
		100 %	1000 gm

Cream was prepared in three steps as follows

Preparation of Phase I (Water phase): To formulate Phase I; 624 gm of distilled water was taken in a steel vessel and heated. The temperature was maintained at 75°C-85°C. Preservative Phenoxy-Ethanol (5gm) and Borax (2gm) were added in it and mixed well.

Preparation of Phase II (Oil phase): To formulate Phase II; 250 gm *Gandhaka Druti* was taken in a 500 ml beaker. It was heated using heating mantle. Temperature was maintained at 85°C. Bees wax and Paraffin wax (8 g each) were added slowly into beaker and stirred slowly till these got melted. Similarly, 25 gm of Emulsifying wax was added. After complete melting, Cetyl alcohol (2 gm), Ceto-steryl Alcohol (20 gm), Stearic acid (6 gm), Glycerol Monostearate (15 gm), Tween-20 (5 gm), and Iso-propyl Myristate (30gm) were added one by one and stirred slowly at maintained temperature till completely dissolved in oil.

Mixing of phase II into phase I (Making oil in water emulsions): Both the vessel and the beaker were removed from the heating mantle. Phase II was poured into Phase I with continuous stirring. Proper mixing was done with the help of hand blender for about 20 min. The emulsion was let to cool slowly maintaining a decreasing temperature (80°C-50°C). After cooling the formulation, few drops of Neem & Tulasi fragrance was added in it.



Figure 9: Prepared gandhak druti cream.

Table A1: Physiochemical analysis of prepared gandhak druti cream.

Sr. No	Test	Result
1.	Appearance	Thick Black Syrupy Liquid
2.	Colour	Black
3.	Order	Emitting obnoxious Sulphury Smell
4.	Taste	Strong Bitter

5.	pH	6.5
6.	Loss On Drying	3.60
7.	Loss on ignition	24.75
8.	Solubility	4.44

Antimicrobial and Antifungal activity of gandhak druti

Method

Cup plate method

Gandhak Druti was tested against

- 1) *Staphylococcus aureus*,
- 2) *Pseudomonas aeruginosa*
- 3) *Candida albicans*

This method depends on the diffusion of the drug from cavity through solidified agar layer. Such that growth of the added microorganisms is prevented entirely in a circular area or zone around the cavity containing solution of the drug.^[8]

Sr. no.	Test organism	Observations	Diameter of zone of inhibition	Remark
1	S. Aureus	No zone of inhibition	None	Resistant
2	P. Aeruginosa	No zone of inhibition	None	Resistant
3	C. Albicans	zone of inhibition observed	18 mm	Susceptible

Antimicrobial and Antifungal activity of gandhak druti cream

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DISCUSSION

This study was conducted to investigate the antibacterial and antifungal properties of *Gandhak Druti* and *Gandhak Druti cream*. For this purpose, *Gandhak Druti* and *Gandhak Druti Cream*

was tested against *Staphylococcus aureus*, *Pseudomonas aeruginosa* and *Candida albicans* bacteria. *Candida albicans* was found to be sensitive to Gandhak Druti and Gandhak Druti Cream and its zone of inhibition was 18 mm. In Ayurvedic texts, it is called Krimigna. Gandhak Druti also has various medicinal properties as stated in Ayurvedic literature. It is used in the treatment of Kusta, Kandu^[9] and similar diseases where bacterial and fungal infections clearly play a role. Therefore, from the classical texts we can say that Gandhak Druti and Gandhak Druti Cream has anti-bacterial and anti-fungal properties.

CONCLUSION

Gandhaka Druti Cream has been formulated and formulated using simple methods and ingredients that are allowed in Rule Number 169 of the Drugs and Cosmetic Act 1940 and rules 1945 . This oil in water emulsion uses Gandhika Druti as a previously untested ingredient. It has good healing properties. The physicochemical results can be considered as fingerprints of the formulation and can act as results used for future formulations. This study shows that the formulation is safe dermatologically. However, further research and analysis are needed to evaluate its physicochemical properties and effectiveness in dermatological diseases.

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