

# Investigation of Preservative Efficacy and Microbiological Content of Some Herbal Cosmetics Found in the Market

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**Abstract:** In this study, microbial content and preservative efficacy of various Patanjali marketed seven herbal cosmetic products, which are produced and sold in markets of Maharashtra, were investigated. Microbial content and preservative efficacies of products were investigated according to Indian Herbal Pharmacopoeia formulation were analyzed by serial dilution method and result obtained for all the seven samples showed the total viable count of microorganism below the limit as per the Indian Herbal Pharmacopoeia. Patanjali Herbal Cosmetic formulation were analysed for preservative efficiency testing using Di methyl Sulphoxide was used as control for testing against Escherichia coli NCIM-2256. Microorganism total viable count 91 to 301 cosmetic products were recovered in the range as per standard of Indian herbal pharmacopoeia standard for preservative efficiency testing, and showed excellent antimicrobial property against Escherichia coli.

**Keywords:** Escherichia coli, Herbal cosmetic formulation, Preservative efficacy test, Serial dilution method, Total viable count.

## 1. Introduction [1]

Cosmetic is defined as “Any article intended to be rubbed, poured, sprinkled or sprayed on, or introduced into, or otherwise applied to, the human body or any part thereof for cleansing, beautifying, promoting attractiveness, or altering the appearance, and includes any article intended for use as a component of cosmetic.

Herbal cosmetic is used worldwide since ancient time, but in the last decade, there has been a renewed craze of herbal cosmetics and personal care products, especially in the skin care segment with the growing belief that chemical-based cosmetics are harmful and herbal cosmetics are safe being natural.

### A. Quality Assurance [2]

The government should honour efforts by issuing certificates to producers and farmers who adhere to the GACP. Implementation of such requirements is only possible if the production and marketing of herbal cosmetic is subject to an adequate registration scheme by a drug regulatory authority.

All herbal-based medicinal products should meet the requirements for safety, efficacy and quality, as per the categories of Herbal product. All imported herbal medicinal products need to meet the requirements for safety, efficacy and quality control regulations in the importing countries.

### B. Assessment of microbial quality of herbal cosmetics [3]

The demand for natural herbal cosmetics is increasing day by day because of their advantage, as natural and less side effects, over the chemical based preparations, so safe. People have misconceptions that herbal cosmetics, beautifully packed in fashionable containers are safe for use. The purpose of assessment of microbial quality is to help those concerned with the production or import of cosmetic products to maintain a good microbiological quality all through the life of the product.

### C. Microbial count [4]

Table 1  
Microbial limits for herbal cosmetic as per Indian Herbal Pharmacopoeia

S. No.	Product	Microbial Limit (CFU/g or CFU/mL)
1	Shampoos	Total Microbial Count 1000 Maximum
2	Skin creams and lotions	Total Microbial Count 1000 Maximum
3	Baby products	Total Microbial Count 200 Maximum
4	Eye products Total	Total Microbial Count 100 Maximum
5	Lip care	Total Microbial Count 1000 Maximum
6	Tooth paste and tooth powders	Total Microbial Count 1000 Maximum
7	All other products, requiring microbiological assessment	Total Microbial Count 1000 Maximum

Medicinal plant material normally carries a greater number of Bacteria and molds, often the soil origin. Aerobic spore forming Bacteria frequently predominate. Current practices of harvesting handling and production often causes additional contamination and growth. So it become necessary to

quantitatively evaluate the bacteria in herbal cosmetic samples. The limit of total microbial count as per Indian herbal pharmacopoeia is given in following Table 1.

### 2. Review of Literature

1. Lalita. C.H. Rao. V.V. et. al. [5] (2014) Studied Antimicrobial efficacy of low level cosmetic preservatives. Said work investigated antimicrobial efficacy of the preservatives phenoxyethanol, potassium sorbate, sorbic acid, methyl paraben, propyl paraben and sodium benzoate. The minimum inhibitory concentrations of the preservatives against staphylococcus epidermidis, and pseudomonas aeruginosa were studied.
2. Rajapandiyan K. Shanthi. S, et. al. [6] (2013) studied Assessment of microbial quality in marketed herbal drugs sold in Trichy city. The said work studied 12 different herbal medicines were evaluated for Total aerobic count, showed that most of the marketed herbal drugs had above WHO bacteriological limit.
3. Michael. M.D. Patricia F.C. et. al. [7] (2011) studied Microbiological quality assessment of some brands of cosmetics powders. A total of 60 samples, 20 each of three different brands of cosmetic powders were analysed, And the mean aerobic plate counts obtained were within the limits.
4. Hubgo P.G., Onyekweli A.O. et. al. [8] (2003) Studied Microbial contamination and preservative capacity of some brands of Cosmetic creams. The said work studied commercially available multiple cosmetic preparations for preservative efficiency testing and total viable count. They reported that the commercial cosmetic creams and lotions evaluated did not meet the standards for microbial limits as specified in official monographs, and such products can adversely affect health status of consumers as well as the stability profiles of the products.

### 3. Plan of Work

- Preservative Efficiency testing.
- Selection of microorganism.
- Selection of appropriate culture media.
- Preparation of sample in appropriate medium.
- Incubation for 48 hours.
- Measurement of preservative efficiency.
- Total Viable Count Testing.
- Selection of method.
- Sample inoculation.
- Incubation for 24 hours.
- Measurement of total viable count.
- Statistical analysis.
- Compilation of microbial study data.

Table 2  
Herbal cosmetic samples selected for study

S. No	Name of samples	Sample Code	Product information
01	Kesh kanti Shampoo	A	Patanjali Ayurved Ltd. Mfg Lic No: Ultra/Ayu-181/2009 Batch No: KK09 Mfg Date: 12/15 Exp Date: 12/17
02	Rose Facewash	B	Patanjali Ayurved Ltd. Mfg Lic No: Ultra/Ayu-181/2009 Batch No: B15/136 Mfg Date: 10/15 Exp Date: 04/17
03	Drusthi Eye drop	C	Patanjali Ayurved Ltd. Mfg Lic No: Ultra/Ayu-181/2009 Batch No: B15/136 Mfg Date: 10/15 Exp Date: 10/16
04	Dant kanti junior Dental Cream	D	Patanjali Ayurved Ltd. Mfg Lic No: Ultra/Ayu-181/2009 Batch No: CD38 Mfg Date: 12/15 Exp Date: 05/17
05	Haldi chandan kanti Soap	E	Patanjali Ayurved Ltd. Mfg Lic No: Ultra/Ayu-181/2009 Batch No: BQ436 Mfg Date: 11/15 Exp Date: 11/17
06	Crack Heal cream	F	Patanjali Ayurved Ltd. Mfg Lic No: Ultra/Ayu-181/2009 Batch No: AE10 Mfg Date: 10/15 Exp Date: 10/17
07	Beauty cream	G	Patanjali Ayurved Ltd. Mfg Lic No: Ultra/Ayu-181/2009 Batch No: BQ436 Mfg Date: 11/15 Exp Date: 11/17

### 4. Experimental and results

#### Instruments

- Electronic weighing balance Model No.AW-220 & BX-620 S, Shimadzu Corporation, Koyto, Japan.
- Hot Air Oven (Kumar lab)
- Cooling Incubators Remi instruments
- Autoclave Secore Scientific Engineering Work.
- All required chemicals were purchased from Loba Chemie Pvt. Ltd, Mumbai.
- Deionised water was purchased from Local Market, Wardha.

#### Preservative Efficiency Testing

- The test organism used for antimicrobial activity Escherichia coli NCIM-2256.
- The bacterial culture was maintained on nutrient agar plate.
- Stock culture was stored in refrigerator at 4° C.
- The test solution was prepared in Dimethyl Sulphoxide.
- Dimethyl Sulphoxide was used as control.
- The ratio Herbal cosmetic and Dimethyl Sulphoxide

(1:1)

- A nutrient agar medium was used.
- Microorganism was seeded uniformly over surface of agar plate and cup was dug using a flamed cork borer and aseptically filled with the sample solution (100µl/well).
- The plate was incubated at 37° C for 48 hour and zone of inhibition was measured with the help of antibiotic scale.
- Zone of inhibition was shown in Figure 1.

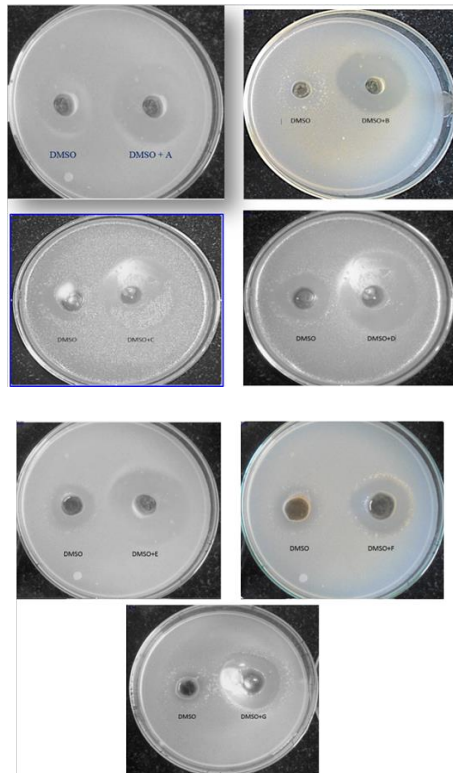


Fig. 1. Preservative efficiency capacity of herbal cosmetic sample

Table 3  
Zone of inhibition

Sample Code	Name of samples	Zone of inhibition in 50% diluted solution (mm)	Zone of inhibition of diluent (mm)
A	Kesh kanti Shampoo	18	10
B	Rose Facewash	15	9
C	Drusthi Eye drop	17	10
D	Dant kanti junior Dental Cream	15	11
E	Haldi chandan kanti Soap	17	10
F	Crack Heal cream	16	10
G	Beauty cream	16	10

#### Total Viable Count (TVC)

This test method is designed to detect the presence of microorganisms in a Herbal cosmetics.

#### A. Spread Plate Method

- 15 gm of agar medium was melted on water bath.
- The melted agar medium was sterilized at 120° C for 2 hour. Then transferred into the plate aseptically, and semi-solidified at RT.
- Then 1 mL of cosmetic suspension in sterile water was spread on surface.
- Plate was incubated at 30°C for 24 hour.
- TVC was measured using colony counter.
- The above section says how to prepare a subsection. Just copy and paste the subsection, whenever you need it. The numbers will be automatically changes when you add new subsection. Once you paste it, change the subsection heading as per your requirement.

Table 4  
Reading for Total Viable Count

Sample code.	Name of samples	Total viable count/mL
A	Kesh kanti Shampoo	275
B	Rose Facewash	301
C	Drusthi Eye drop	91
D	Dant kanti junior Dental Cream	116
E	Haldi chandan kanti Soap	124
F	Crack Heal cream	289
G	Beauty cream	178

Seven Patanjali Herbal Cosmetic formulations were studied for Total viable count and Preservative efficiency testing by serial dilution method.

#### Preservative efficacy testing

The Patanjali Herbal Cosmetic formulation were analysed for preservative efficiency testing, and showed excellent antimicrobial property against a E. coli.

#### Microbial count

The Patanjali Herbal Cosmetic formulation were analysed by serial dilution method and result obtained for all the seven samples showed the total viable count of microorganism below the limit as per the Indian Herbal Pharmacopoeia.

### 5. Conclusion

Patanjali Herbal Cosmetic formulation were free from the microorganism might be because of efficient preservative system.

### References

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