

# “STUDY OF ANTIMICROBIAL AND HAIR REGROWTH ACTIVITY OF TRIDAX PROCUMBENS FOR SCALP DISORDER”

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## Abstract

The proposed topic involves formulation, development, and evaluation of hair gel-cream using *Tridax procumbens*. The need for such a product is to reduce white hair, reduce fungal infection, and prevent hair loss. *Tridax procumbens* contain chemical constituents like tannins, flavonoids, Saponin and it shows antimicrobial activity against *E.coli*, *P.aeruginosa*, *bacillus subtilis*, *Staphylococcus aureus*. Stability parameters of the formulation showed that there was no significant variation during stability study, uniform viscosity, and less moisture content were observed throughout the study and no irritation and redness were caused during patch test.

**Keyword:** Anti-microbial, *Tridax procumbens*, *Staphylococcus aureus*

## 1. INTRODUCTION

### 1.1. Hair

Hair is often a protein filament that grows from follicles found within the dermis. Hair is one altogether the defining characteristics of mammals. The build, apart from areas of glabrous skin, is roofed in follicles that produce thick terminal and fine vellus hair. The word hair usually refers to 2 distinct structures:

1. The part beneath the skin called the **hair follicle**, or when pulled from the skin, the bulb. This organ is found within the dermis and maintains stem cells, which not

only re-grow the hair after it falls out but also are recruited to regrow skin after a wound.

2. **The shaft**, which is that the tough filamentous portion that spreads above the skin surface. A cross fragment of the hair shaft is also divided roughly into three zones.

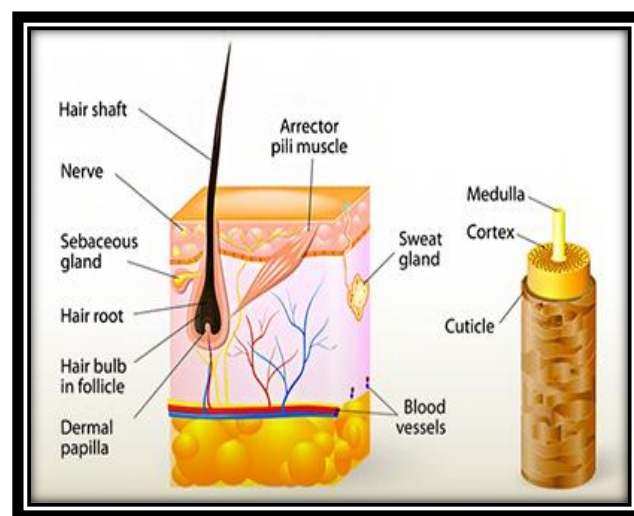


Fig.1. Hair Structure

Hair fibers have a structure consisting of several layers, starting from the outside:

1. The cuticle which carries with it several layers of flat, thin cells laid out overlapping one another as roof shingles
2. The cortex, which contains the keratin bundles in cell structures that remain roughly rod-like

3. The medulla, a disorganized and open area at the fiber center.

Hair is one altogether the typical features and several functions like defense against external factors; producing sebum, apocrine exudate and pheromones, influence on social and sexual interaction; thermoregulation, and being a resource for stem cells. Hair could even be a derivative of the epidermis and consists of two distinct parts: the follicle and thus the hair shaft. The follicle is the essential unit for the generation of hair. The hair shaft consists of a cortex and cuticle cells, and a medulla for a few varieties of hairs. Hair follicle encompasses a continual growth and rest sequence named hair cycle. The time of development and rest cycles is coordinated by many endocrine, vascular and neural stimuli and depends not only on the localization of the hair but also on several factors, like age and nutritional habits

### 1.2. Hair Disorders

1. **Scarring alopecia**- It is also known as cicatricial alopecia is the loss of hair. It destroys the hair follicle, replace with scar tissue and cause permanent hair loss  
Cause-Lichen planopilaris, pseudopelade
2. **Folliculitis**- In which hair follicle becomes inflamed caused by a bacterial or fungal infection. It looks like a small red bump or white-headed pimples.  
Cause-Staphylococcus aureus,  
Pseudomonas aeruginosa.
3. **Seborrheic dermatitis**- It is a very common condition causes redness, scaly patches, dandruff  
Causes-Malassezia yeast
4. **Tinea Capitis**- Dry scaling, black dots, yellow crusts. It is a fungal infection on a scalp attack on the hair shaft.  
Cause-Microsporum gypseum
5. **Impetigo**- Forms blisters may look inflamed and crusty release yellow fluid, sores. It is a contagious bacterial infection.

Causes-Streptococcus, Staphylococcus aureus.

### 1.3. Hair Regrowth Cycle

- The three stages of hair regrowth are:-
  - 1) Anagen Phase
  - 2) Catagen Phase
  - 3) Telogen Phase
- Each strand of hair on the human body is at its stage of development.
- Once the cycle is complete, it restarts and a new strand of hair begins to form.
- The rate or speed of hair growth is about 1.25cm or 0.5 inches per month, or about 15cm or 6 inches per year.

### 1.4. Anagen Phase

- The anagen phase is understood because of the growth phase. This is the phase where the hair physically grows approximately 1cm per month.
- It begins within the papilla and may last from 2 to six years. The span at which the hair remains during this stage of growth is decided by genetics.
- The longer the hair stays within the anagen phase, the longer it'll grow. During this phase, the cells within the papilla divide to supply new hair fibers, and also the follicle buries that one into the layer of the skin to nourish the strand. About 85% - 90% of the hairs on one's head is surrounded by the anagen phase at any particular time.

### 1.5. Catagen Phase

The catagen phase also called the transitional phase, agrees the follicle to, in a sense, restart itself. Through this period, which takes about measure, the follicle shrinks to disintegration and thus the papilla divides and

“rests,” cutting the hair strand off from its nutritious blood supply.

- Signals sent out by the body determine when the anagen phase ends and the catagen phase begins.
- The first sign of catagen is the ending of melanin production in the hair bulb and apoptosis of follicular melanocytes.
- While hair is not growing through this phase, the length of the terminal fibres grows when the follicle pushes them upward.

### 1.6. Telogen Phase

- During the telogen or resting phase (also spoken as shedding phase) the follicle remains dormant for one to four months. 10%-15% of the hairs on one’s head are during this phase of growth at any given time.
- In this phase the epidermal cells lining the follicle channel still grow as normal and might accumulate around the base of the hair, temporarily anchoring it in situ and preserving the hair for its natural purpose without taxing the body’s resources needed during the expansion phase.
- At some point, the follicle will begin to grow again, softening the anchor point of the shaft

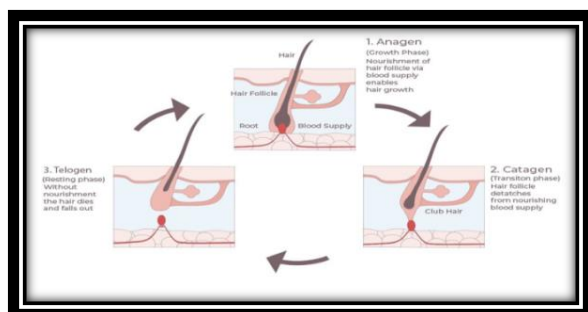


Fig.2. Hair Cycle

## 2. ACTIVE PROFILE

### 2.1. *Tridax procumbens*

*Tridax procumbens*, commonly called coat buttons or tridax daisy, maybe a species of flowering plant within the daisy family. it's best called a widespread weed and pest plant. *Tridax procumbens* is traditionally used ayurvedic medicine for hair growth and is sometimes dispensed in situ of Bhringraj. the current study was aimed to assess the efficacy of *Tridax procumbens* for his or her

traditional use in hair growth-promoting activity.

- Kingdom- **Plantae**
- Family – **Asteraceae**
- Genus- ***Tridax***
- Common name- Coat Buttons, Tridax daisy
- *Tridax procumbens* is effective against both gram +ve and gram –ve bacteria.
- The presence of chemical compounds tannins, flavonoids, and saponins of *Tridax procumbens* may inhibit bacterial growth.



Fig.3. *Tridax Procumbens*

### 2.1. Chemical Constituent:

- Gluco luteolin- Reducing dandruff, Prevent breakage.
- Tannin- Convert gray hair into black hair.

- Beta-Sitosterol- Reduce hair loss.
- Saponins- Antifungal and Antibacterial Activity.
- Flavonoids-Antioxidant effect.

### 3. MATERIALS AND METHODOLOGY

#### 3.1. Product Trail

Sr. no	Type	<i>Tridax Procumbens</i>	Glycerine	Xanthum Gum
1.	Cream	✓	✓	×
2.	Gel Cream	✓	✓	✓
3.	Gel	✓	✓	✓

Type	Aloe juice	Allantoin	E.Wax	GMS
Cream	×	✓	✓	✓
Gel Cream	✓	✓	✓	✓
Gel	✓	✓	×	×

### 4. EXPERIMENTAL WORK

#### 4.1 Extraction Method:-

- Cold Maceration-

50gm of dried part of the plant  
 ↓  
 Soak 50gm dried part in 250ml of ethyl alcohol  
 ↓  
 Stand it for 7days with occasionally stirring  
 ↓  
 Filter it by using Whatman no.1 filter paper



Fig.4. Stained and expressed Liquid are Mixed and Clarified

#### 4.2 Gel Cream

Gel-cream is water-based lotions that are lightweight in texture and easily absorbed into hairs, this is because they do not add any extra oil to hair. Instead, they hydrate and moisturize the skin without leaving a film or residue which is especially important to shine. The gel-cream is a hydrating product. Gel cream contains a lot of humectants ingredients, which means ingredients that attract and retain water, making them super hydrating. The simple gel-cream does not only straightening and holding as well as nourishes the hair. The broad idea about the hair gel-cream contains natural, essential elements that give a drastic effect on the hairs. The gel-cream when applied to the hairs so it gets easily

distributed into the hairs as an interlocking mechanism. The gel-cream thoroughly penetrates the thin layers of skin where hairs are grown. The active and other penetrable materials help the hair root to grow faster and reduce the sign of hair problems

#### 4.3 Procedure for Gel Cream

1. All the ingredients were weighed accurately.
2. Xanthan Gum was kept in contact with half quantity of water for 24hrs and the gel base was prepared.
3. In one beaker cetyl alcohol, glycerol monostearate, E.wax was weighed accurately and in another beaker aloe juice, glycerine, allantoin, preservative, and the remaining water was weighed
4. Gel phase and Oil phase was mixed with continuous trituration, then active was added in it
5. Later, perfume and color and was added in the formulation and mixed well
6. Finally the product was filled into containers.

#### 4.4 Formulation Table

Sr. no	Ingredients	B <sub>1</sub>	B <sub>2</sub>	B <sub>3</sub>	B <sub>4</sub>
1.	Cetyl alcohol	2.3%	3%	2.7%	3.5%
2.	Glycerol monostearate	4%	3%	6%	5%
3.	Emulsifying Wax	10%	7%	10.5%	9%
4.	Xanthan gum	2.5%	2%	3.5%	3%
5.	<i>Tridax procumbens</i> extract	4.3%	6.0%	5%	5.5%
6.	Glycerine	4%	5.5%	6.5%	5%
7.	Water	70.6%	72.2%	64%	67.2%
8.	Allantoin	2%	1%	1.5%	1.5%
9.	Methyl Paraben	0.30%	0.30%	0.30%	0.30%

## 5. CONCLUSION

Formulation B3 was found to have sufficient consistency.



Fig.5. Formulated Hair Gel Cream

## 6. EVALUATION TEST

### A. Evaluation parameters of extract

- I. Phytochemical Test
- II. Antimicrobial test

### B. Evaluation of Cream

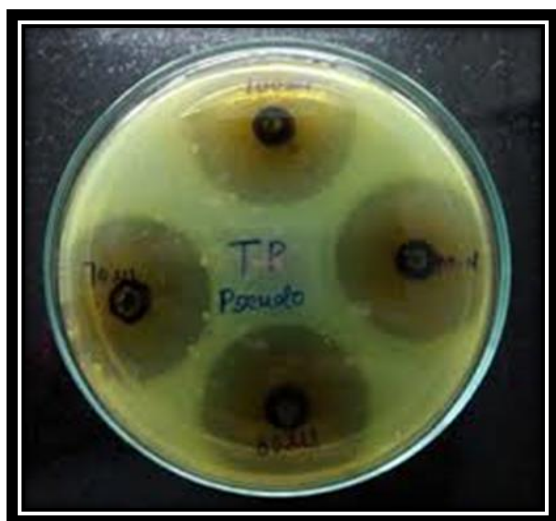
- I. Physical Evaluation
  - Colour
  - Consistency
  - Odor
- II. Thermal Stability test
- III. Viscosity
- IV. pH test
- V. Moisture Content
- VI. Total Fatty Matter
- VII. Patch test

### A. Evaluation parameters of extract:-

**I. Phytochemical Test :**

Test	Observation	Inference
<b>Flavonoids</b>	The yellow solution turns colorless	Test was passed
<b>Saponin</b>	Honey comb-like forth was founded	Test was passed
<b>Tannins</b>	Yellowish-brown ppt was formed	Test was passed

**II. Antimicrobial Test:**



• **Antibacterial assay of Tridax procumbens L.Extracts**

Selected pathogens	Acetone extract	50% ethanolic extract	Methanolic extract
<b>E.coli</b>	1.151	–	–
<b>P. aeruginosa</b>	2.428	–	2.586
<b>Bacillus subtilis,</b>	–	–	–
<b>Staphylococcus aureus</b>	–	2.667	–

the whole plant of Tridax has informed its antimicrobial activity on several species of bacteria. Fresh plant juice when applied twice daily for 3-4 days cures cuts & wounds. The whole plant extract, when used against 4 strains of bacteria –2 gram-positive- B, Staphylococcus

aureus & two Gram negative E. coli & P.aeruginosa, showed anti-bacterial activity only against P. aeruginosa. antifungal property against three phytopathogenic fungi i.e. Helminthosporiumoryzae, rhizocloneasolani & pyriculariaoryzae. Methanolic extract of leaves of T.procumbens was found to maneuver against two tested fungi. The fungal strain of A. niger and A. ochraceous shows zone of inhibition 13mm and 12mm respectively where positive control (ciprofloxacin) produced a zone of inhibition 11mm and 10mm respectively. The n-hexane extract of the flower showed activity against E. coli. Amongst the assorted karmas defined of Tridax procumbens, its antimicrobial action, in the present era when the man is surrounded by countless microorganism & frame has become proof against many of the strains of bacteria & fungi, has emerged as a replacement ray of hope

**B. Evaluation parameters of cream:-**

**I. Physical Evaluation:**

- i. **Colour:** -Light green.
- ii. **Consistency:**-Semi-Solid
- iii. **Odor:**-Pleasant

**II. Thermal Stability Test:**

Stability	1 <sup>st</sup> Week	2 <sup>nd</sup> Week	3 <sup>rd</sup> Week	4 <sup>th</sup> Week
<b>B<sub>1</sub></b>	Stable	Instable	Instable	Instable
<b>B<sub>2</sub></b>	Stable	Stable	Instable	Instable
<b>B<sub>3</sub></b>	Stable	Stable	Stable	Stable
<b>B<sub>4</sub></b>	Stable	Stable	Stable	Instable

**Conclusion:-**

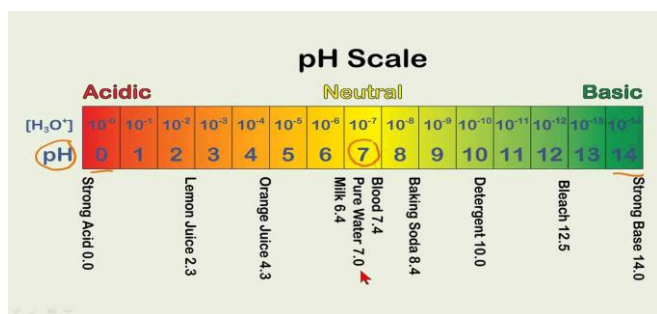
From the above test it was observed that formulation B<sub>3</sub> was stable throughout stability period formulation B<sub>1</sub>, B<sub>2</sub>, B<sub>4</sub> shown instabilities at week 3 week 4.

**III. Viscosity:**

Viscosity	1 <sup>st</sup> Week	2 <sup>nd</sup> Week	3 <sup>rd</sup> Week	4 <sup>th</sup> Week
B <sub>1</sub>	22080 cps	22076 cps	22075 cps	22074 cps
B <sub>2</sub>	22055 cps	22054 cps	22053 cps	22050 cps
B <sub>3</sub>	23230 cps	23228 cps	23227 cps	23226 cps
B <sub>4</sub>	23235 cps	23233 cps	23232 cps	23229 cps

**Conclusion-** It was found that formulation B<sub>3</sub> shown uniform viscosity throughout the study.

#### IV. pH Test:



pH	1 <sup>st</sup> Week	2 <sup>nd</sup> Week	3 <sup>rd</sup> Week	4 <sup>th</sup> Week
B <sub>1</sub>	5.1	5.4	5.0	5.9
B <sub>2</sub>	5.0	5.4	5.7	5.8
B <sub>3</sub>	5.8	5.9	5.9	6.0
B <sub>4</sub>	5.8	5.9	5.9	5.7

**Conclusion:** - It was found that formulation B<sub>3</sub> shown uniform pH throughout the study.

#### V. Moisture Content:

Moisture Content	1 <sup>st</sup> Week	2 <sup>nd</sup> Week	3 <sup>rd</sup> Week	4 <sup>th</sup> Week
B <sub>1</sub>	55%	55%	54%	53.7%
B <sub>2</sub>	53%	52%	51%	48%
B <sub>3</sub>	45%	45%	44.9%	44.8%
B <sub>4</sub>	46.2%	46.2%	45.5%	44.5%

**Conclusion:-**B<sub>3</sub> moisture content was found to be less among all.

#### VI. Total Fatty Matter:

Total fatty matter	1 <sup>st</sup> Week	2 <sup>nd</sup> Week	3 <sup>rd</sup> Week	4 <sup>th</sup> Week
B <sub>1</sub>	44.7193 %	44.6292 %	43.0111%	43.0112 %
B <sub>2</sub>	30.0590 %	29.8700 %	29.56235 %	29.0555 %
B <sub>3</sub>	27.2939 %	26.9930 %	26.9830%	26.0000 %
B <sub>4</sub>	32.7595 %	31.5674 %	31.2357%	30.0000 %

**Conclusion:-** From the above test it was observed that formulation B<sub>3</sub> has less moisture content than B<sub>1</sub>, B<sub>2</sub>, B<sub>4</sub>

#### VII. Patch Test:

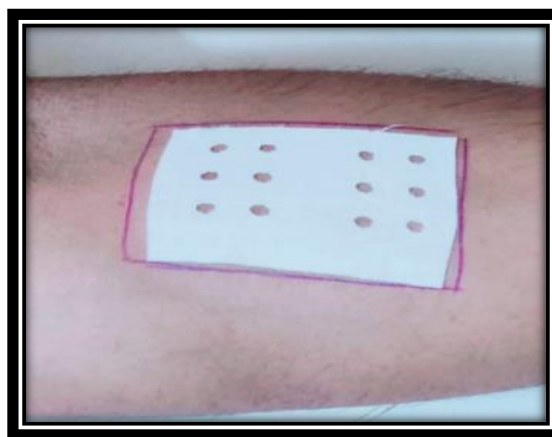


Fig.6. During Patch Test

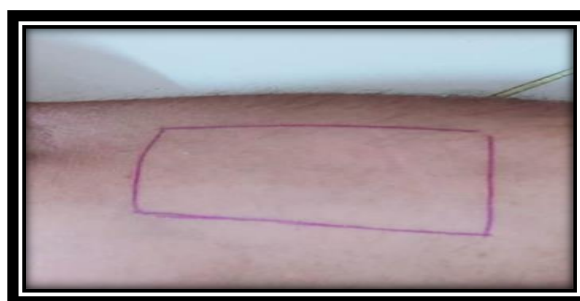


Fig.7. After Patch Test

**Conclusion:-** After performing patch test no redness, irritation was caused.

## 7. RESULT

Tridax procumbens extract was prepared by using the cold maceration process using alcohol as a solvent. It contains chemical constituent like Tannins, Flavoids, Saponin and it shows antimicrobial activity against E.coli, P. aeruginosa, Bacillus subtilis, Staphylococcus aureus.

Gel-cream was formulated on trial and error basis by using *tridax procumbens* extract and B<sub>3</sub> was stable throughout stability period formulation B<sub>1</sub>, B<sub>2</sub>, B<sub>4</sub> shown instabilities at week 3 week 4 and it shows uniform viscosity throughout the study and it was observed that formulation B<sub>3</sub> has less moisture content than B<sub>1</sub>, B<sub>2</sub>, B<sub>4</sub>, and no irritation and redness was caused during patch test. From the above data, B<sub>3</sub> passed all the parameters.

## 8.CONCLUSION

The present work involves formulation, development, and evaluation of hair gel cream. *Tridax procumbens* was used to reduce white hair, reduce fungal infection, and prevent hair loss. Stability parameters of the formulations showed that there was no significant variation during stability study, thus the present study concluded that it is possible to develop hair gel-cream using *Tridax procumbens*.

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