A Review On Herbs Used In Anti-Dandruff Shampoo And Its Evaluation Parameters

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ABSTRACT
Dandruff is a common disorder affecting the scalp condition caused by yeast Pityrosporum. Dandruff cannot be completely eliminated but can only be managed and effectively controlled. Symptoms of dandruff mainly include Presence of fragments, Itching of the scalp, and Redness around the scalp. Dandruff can be treated in two ways. They include chemical based antidandruff shampoo and herbal based antidandruff shampoo containing antibacterial and antifungal ingredients like ketoconazole, selenium sulfide, zinc pyrithione etc. The anti-dandruff shampoo only slow down the scalp flaking and have their own disadvantages like loss of hair, increased scaling, itching, irritation, nausea, headache, vomiting, photosensitivity. Herbal extracts formulations are viable alternative to synthetic drugs. Now-a-days, many herbal shampoos are available in the market which contains herbal ingredients such as plant extracts and essential oils. In the present review we discuss about the causes, synthetic chemical, various herbs and the evaluation parameters for the anti-dandruff shampoo.

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1. INTRODUCTION

Dandruff, the excessive shedding of dead skin cell from scalp, is apparently caused by a fungus called *Malassezia restricta* and *M. globosa*. *Malassezia* formerly called *Pityrosporum* is a yeast causing infection of skin and scalp (Shuster, 1984). The replacement of cells on the scalp occurs slowly and is not visible to the eye. The process of change is happening every month. If this process becomes faster, then there will be disruption on the scalp which we call dandruff. Warm and humid atmosphere, overcrowding and poor personal hygiene are ideally suited for the growth of *Malassezia* (Rippon, 1982). Dandruff affects 5% of the population and mostly occurs after puberty, between 20-30 years and dandruff affects males more than females. (Agarwal *et al*. 2009)

1.1 Causes of dandruff

One cause of dandruff is the fungus *Pityrosporum ovale* (*P. ovale*), which is naturally present on the scalp and other parts of the skin. Generally this fungus causes no harm. However, with the weather changes, hormonal, and stress, the scalp will produce more oil, causing the fungus *P. ovale* to proliferate. With the proliferation of the fungus, itching of the scalp skin cells and the loss of hair follicles and so called dandruff will comes. The exact mechanism of dandruff formation is now believed to be the result of the formation of enzymes called lipases. The Malassezia fungus uses these enzymes to break down sebum to oleic acid. The oleic acid then penetrates the top layer of skin and causes increased skin cell turnover in susceptible people. This in turn causes dandruff flakes and sometimes itching and redness.

1.2 Symptoms of dandruff

Symptoms of dandruff mainly include the following

- Presence of fragments
- Itching of the scalp
- Redness around the scalp.

2. TREATMENT OF DANDRUFF:

There are two choices in treating dandruff, chemical based anti dandruff shampoo and treatment, or the organic dandruff solution using herbal dandruff shampoo.

2.2 Shampoo

A shampoo is a preparation containing surfactant (i.e. surface active material) in a suitable form – liquid, solid or powder – which when used under the specified conditions will remove surface grease, dirt, and skin debris from the hair shaft and scalp without adversely affecting the user. Shampoos may be Powder Shampoo, Liquid Shampoo, Lotion Shampoo, Cream Shampoo, Jelly Shampoo, Aerosol Shampoo, and may be Specialized Shampoo like Conditioning Shampoo, Anti- dandruff Shampoo, Baby Shampoo, and Two Layer Shampoo.

2.3 Ingredients of Shampoo

Most shampoos contain water, a detergent (cleaning agent), surfactant (lather making agent), salt, fragrance (natural and artificial), preservative and food coloring. With the exception of water and salt (sodium chloride), different chemical compounds are used depending on the desired result of the shampoo. Many shampoos also contain vitamins and moisturizing alcohols to prevent too much of the hair and scalp’s natural oils from being stripped away during cleansing.

3. Herbal Antidandruff Shampoo:

Herbal dandruff shampoo does not contain any unsafe elements; unlike synthetic shampoo it is obtained naturally from organic ingredients and medicated specifically to treat dandruff problems. Herbal dandruff shampoo is safe for daily use and gives nutrients and other essential vitamins for your hair and scalp.
3.1 Advantages of Herbal Shampoo over Chemical Shampoo

Hundreds of shampoos claim to make one's tresses as those in fairy tales. Chemical shampoos might appear to be improving hair texture along the length but eventually end up damaging the roots and cause:

- Premature aging, graying of hair
- Scalp dryness and itchiness
- Split-Ends and Excessive hair loss

To combat all such problems, it is best to switch to a herbal shampoo which will make up for the loss of nutrients and nullify the damage way.

4. Herbs used in the treatment of Dandruff

Herbal drugs or their formulations are viable alternative to synthetic drugs. During the past few decades, there has been a dramatic increase in the use of natural products in cosmetics. Natural botanicals may be used in their crude Form or they may be extracted, purified or derivatized to render them more suitable for use in cosmetic. A wide range of active principles of various plants including vitamins, hormones, phyto-hormones, bioflavanoids, enzymes, tannic acid, fruit acids, amino acids, sugars, glycosides and essential oils, are being considered useful in cosmetic formulations. The need for cosmetics with herbs is primarily because it is believed that these products are safe and free from side effects. Now-a-days, many herbal shampoos are available in the market which contains herbal ingredients such as plant extracts and essential oils. There are large numbers of plants which are reported to have beneficial effects on hair and are commonly used in shampoos. (Arora, P; et al. 2011)

4.1 Henna (Lawsonia inermis)

Henna from the plant Lawsonia inermis family Lythraceae, which contain a dye molecule called Lawsone, which when processed becomes Henna powder. Henna has a natural affinity with the proteins in our hair, making it able to "stain" the colour onto the hair shaft.

4.2 Neem (Azadirachta indica)

The herb, Azadirachta indica, family Meliaceae has been found to have the properties of a blood purifier and beauty enhancer. It is used for a number of medicinal purposes. Some areas where it can be used in the treatment of common cosmetic problems are skin cleanser.

4.3 Tea Tree Oil (Melaleuca alternifolia)

Tea tree oil, (Melaleuca alternifolia) is an antiseptic favored among herbalists, and has special disinfectant substances that can penetrate the top layers of skin on the scalp, reducing irritation and promoting a healthier scalp.

4.4 Rosemary (Benincasa hipsida)

Rosemary (Benincasa hipsida) is very popular herb when it comes to fighting dandruff. It is used in many commercially available tonic, shampoos and lotions for scalp care, and is even included in many hair growth products.

4.5 Licorice (Glycyrrhiza glabra)

Licorice contains glycyrrhizin, and that can help reduce the scalp's secretion of oils. One theory is that reducing the oils in the scalp can reduce the effects of dandruff, or even cure it completely.

4.6 Lemon (Citrus limon)

Citrus, especially lemon, may be effective against dandruff and other skin problems. It is high in vitamin C, and help to restore the pH balance of the skin. Drops of lemon can be added to an herbal shampoo which also leaves the hair silky and shiny.
4.7 Eucalyptus (*Eucalyptus globulus*)
Eucalyptus oil is another common herbal treatment for dandruff. Few drops of the oil can be mixed with coconut oil, and then massaged into the scalp to remove flakes and treat dandruff. Should be used 1-2 per week for prevention of further problems.

4.8 Fenugreek (*Trigonella foenum graecum*)
Another herbal remedy that has a reputation as a treatment for dandruff. The seeds of this plant are softened and then used as a poultice to reduce the dandruff.

5. MARKETED ANTI DANDRUFF SHAMPOOS
The following shampoos have been selected as best antidandruff shampoo based upon personal experience as well as after going through multiple antidandruff shampoo reviews.

<table>
<thead>
<tr>
<th>Marketed product</th>
<th>Key ingredient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Himalaya herbal antidandruff shampoo</td>
<td><em>Rosmarinus officinalis</em></td>
</tr>
<tr>
<td>Garnier fructis fortifying anti Dandruff shampoo</td>
<td>Pyrithione zinc formula</td>
</tr>
<tr>
<td>Nizoral</td>
<td>Ketoconazole</td>
</tr>
<tr>
<td>Vaadi Anti-Dandruff Shampoo</td>
<td>Tulasi, Neem, Tea tree oil</td>
</tr>
<tr>
<td>Neutrogena T-gel shampoo</td>
<td>Coal tar</td>
</tr>
<tr>
<td>Lumina herbal shampoo</td>
<td><em>Acacia sinuata</em></td>
</tr>
<tr>
<td>SORIG shampoo</td>
<td><em>Emblica officinalis, Santalum album</em></td>
</tr>
</tbody>
</table>

6. EVALUATION OF HERBAL SHAMPOOS
The following evaluation studies have been carried out for the formulated herbal based anti-dandruff shampoo for finding out its quality and efficacy.

6.1 Physical appearance/visual inspection
The prepared shampoo formulations were evaluated for its clarity, foaming ability and fluidity.

6.2 pH of shampoo
pH of prepared shampoo formulation was tested by preparing 10% shampoo solution in distilled water at a room temperature of 25°C. (Mainkar A. R *et al*. 2000)

6.3 Percent of solids contents
A clean dry evaporating dish was weighed and added 4 grams of shampoo to the evaporating dish. The dish and shampoo was weighed. The exact weight of the shampoo was calculated only and put the evaporating dish with shampoo was placed on the hot plate until the liquid portion was evaporated. The weight of the shampoo only (solids) after drying was calculated.

6.4 Rheological evaluations
The viscosity of the shampoos was determined by using Brookfield Viscometer (Model DV-l Plus, LV, USA) rotating at speeds of 0.3 to 10 rpm3 by using spindle T95.

6.5 Dirt dispersion
Two drops of shampoo were taken in a large test tube containing 10 ml of distilled water and then add 1 drop of India ink; the test tube was stoppered and shakes it for ten times. The amount of ink in the foam was estimated as None, Light, Moderate, or Heavy.

6.6 Cleaning action (Sharma P.P *et al*. 2002)
To determine cleansing action of shampoo 5 grams of wool yarn were placed in grease, after that it was placed in 200 ml water containing 1 gram of shampoo in a flask. Temperature of water was maintained at 35ºC then the flask was shaken for about 4 minutes at the rate of 50 times/minute. The solution was removed and sample was taken out, dried and weighed. The amount of grease removed was calculated by using the following equation:

\[ DP = 100 \left(1 - \frac{T}{C}\right) \]

In which,
DP is the percentage of detergency power,
C is the weight of sebum in the control sample,
And T is the weight of sebum in the test sample

6.7 Surface tension measurement
Measurements were carried out with a 10% shampoo dilution in distilled water at room temperature. Thoroughly clean the stalagmometer using chromic acid and purified water, because the surface tension is highly affected with grease or other lubricants. (Hadkar U.B et al. 2009, Gaud R.S et al. 2001)

\[ R_3 = \frac{(W_3 - W_1) n_1 x R_1}{(W_2 - W_1) n_2} \]

Where

- \( W_1 \) is weight of empty beaker.
- \( W_2 \) is weight of beaker with distilled water.
- \( W_3 \) is Weight of beaker with shampoo solution
- \( n_1 \) is no. of drops of distilled water
- \( n_2 \) is no. of drops of shampoo solution.
- \( R_1 \) is surface tension of distilled water at room temperature.
- \( R_2 \) is surface tension of shampoo solution.

6.8 Detergency ability
To evaluate the detergency ability of the samples the Thompson method is used. Hair was, washed with 5% sodium lauryl sulfate (SLS) solution, then dried and divided into 3g weight groups. The samples are suspended in n-hexane solution containing 10% artificial sebum and it was shaken for 15 minutes at room temperature. Then samples are removed, the solvent is evaporated at room temperature and their sebum content determined. In the next step, each sample is divided into two equal parts, one washed with 0.1 ml of the 10% test shampoo and the other considered as the negative control. After drying, the resided sebum on samples are extracted with 20 ml n-hexane and re-weighed. Finally, the percentage of detergency power was calculated using the following equation:

\[ DP = 100 \left(1 - \frac{T}{C}\right) \]

In which,
DP is the percentage of detergency power,
C is the weight of sebum in the control sample
And T is the weight of sebum in the test sample

6.9 Foaming ability and foam stability
Cylinder shake method was used for determining foaming ability. 50ml of the 1% shampoo solution is put into a 250 ml graduated cylinder and covered the cylinder with hand and shaken for 10 times. The total volumes of the foam contents after 1 minute shaking were recorded. The foam volume is calculated only.
Immediately after shaking the volume of foam at 1 minute intervals for 4 minutes were recorded. (Klein K et al, 2004)

6.10 Skin sensitization test

7 groups (n=3) of guinea pigs were collected and on the previous day of the experiment, the hairs on the backside area were removed. Group I was served as normal, without any treatment. Shampoos were applied onto nude skin of animals of remaining groups. A 0.8% v/v aqueous solution of formalin was applied as a standard irritant on animal. The animals were applied with new patch/formalin solution up to 72 hours and finally the application sites were graded according to a visual scoring scale, always by the same investigator. The erythematic scale was as follows: 0, none; 1, slight; 2, well defined; 3, moderate; and 4, scar formation (severe).

6.11 Eye irritation test

6 Albino rats were selected for eye irritation test and about 1% shampoo solutions was dropped into the eyes of albino rabbits and their eyes held open with clips at the lid. Any damage (swelling of the eyelid, inflammation of the iris, ulceration, hemorrhaging (bleeding) and blindness) to the rabbit’s eyes was recorded at specific intervals over an average period of 4 seconds.

6.12 Stability studies

Stability studies were carried out by placing glass tubes and in humidity chamber at 45°C and 75% relative humidity. And their appearance, physical stability were inspected for a period of 3 months at interval of one month.

6.13 The hair strand test-A new method for testing antifungal effects of antidandruff preparations (Peter Maysor et al. 2003)

From ten volunteers of different hair color (six female or Male; mean2 8.2 years, 5 -53 years), hair specimen was taken who did not use any antidandruff preparations or hair dyes. By means of scissor the strands were cut near the scalp surface.

Structure of the trial

4 ml of selective agar media was taken and filled into sterile glass Petri plates of about 3cm in diameter. Cold-sterilized olive oil was inoculated with the different Malassezia strains, which were cultured for four days on SPF over laid earlier with olive oil, and adjust to an inoculation density of 5x 103 CFU/µl. using a Neubauer chamber. Two-hundred micro liters of this suspension were pipette into the prepared Petri dishes so as to cover an area of about one square centimeter (e-1r 06 CFU/cm2).

A model to imitate hair washing procedure as developed as follows:

Hair strands approximately 5 cm in length were taken from each volunteer and incubated with one of the five test substances at 30º c for about 5min. The hairs were then transferred to a sieve with filter paper, rinsed in running water for 1min, and dried at room temperature. By means of sterile scissors, 1-cm pieces were cut from the dried hair and distributed in the center of the different test dishes. To approximate natural scalp conditions, 200 hairs/cm² were inoculated. Growth of Malassezia yeasts as compared with a positive control (200-µl1 inoculation suspension without addition of hair) was evaluated as follows: + = growth, (+) = weak growth and 0 = no growth after incubation at 30ºC. Two hundred micro liters of pure olive oil on SPF with addition of hair was used as a negative control. The trials were performed two times.
Table no 1(a): General ingredients used in the formulation of shampoo.

<table>
<thead>
<tr>
<th>S. No</th>
<th>Component</th>
<th>Examples</th>
<th>Function</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Distilled water</td>
<td></td>
<td>Basis</td>
<td>50-80%</td>
</tr>
<tr>
<td>2.</td>
<td>Primary surfactant</td>
<td>Sulfonates, Sulfates (e.g. alkyl sulfonate)</td>
<td>Cleansing, foaming</td>
<td>8-12%</td>
</tr>
<tr>
<td>3.</td>
<td>Secondary surfactant</td>
<td>Betaines, Sulfosuccinates betaine, polyglucose)</td>
<td>Cleansing, foaming, reduces irritation, reduces drying</td>
<td>2-5%</td>
</tr>
<tr>
<td>4.</td>
<td>Thickener</td>
<td>Salts (e.g. sodium chloride) Gums (e.g. Guar, xanthan cellulose)</td>
<td>Enhances viscosity</td>
<td>2-5%</td>
</tr>
<tr>
<td>5.</td>
<td>Conditioner</td>
<td>Quaternary compounds (e.g. quaternium 87)</td>
<td>Smoothing, detangling</td>
<td>0.1-1%</td>
</tr>
<tr>
<td>6.</td>
<td>Foam booster</td>
<td>Sarcosinate, lactylates</td>
<td>Boosts foam</td>
<td>1-2 %</td>
</tr>
<tr>
<td>7.</td>
<td>Foam stabilizer</td>
<td>Gums (e.g. Guar, xanthan)</td>
<td>Stabilizes foam</td>
<td>0.1-1%</td>
</tr>
<tr>
<td>8.</td>
<td>Suspending agent</td>
<td>Gums (e.g. Guar, xanthan)</td>
<td>Suspends solid particles</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>Opacifier</td>
<td>Polyglycol esters (e.g. glycol distearate)</td>
<td>Pearlescent effect</td>
<td>1-2 %</td>
</tr>
<tr>
<td>10.</td>
<td>Preservative</td>
<td>Parabens, urea derivatives (e.g. Paraben-DU, EDTA)</td>
<td>Avoids spoiling</td>
<td>0.1-0.5%</td>
</tr>
<tr>
<td>11.</td>
<td>Active ingredients</td>
<td>Vitamins, aloe vera etc</td>
<td>Depends on substance</td>
<td>as needed</td>
</tr>
<tr>
<td>12.</td>
<td>Fragrance</td>
<td>Essential oils, artificial fragr</td>
<td>Fragrance</td>
<td>as needed</td>
</tr>
<tr>
<td>13.</td>
<td>Color</td>
<td>Approved pigments</td>
<td>Colors</td>
<td>as needed</td>
</tr>
</tbody>
</table>

Table no 1(b): Synthetic Chemicals for Treatment of Dandruff and Their Drawbacks

<table>
<thead>
<tr>
<th>S no</th>
<th>Drug</th>
<th>Infection type</th>
<th>Products</th>
<th>Drawbacks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Zinc Pyrithione</td>
<td>Dermatophytes/yeast</td>
<td>Head &amp;shoulders</td>
<td>Increased scaling in continuous use</td>
</tr>
<tr>
<td>2</td>
<td>Coal tar</td>
<td>Dermatophytes</td>
<td>Neutrogena T/gel, Tegrin</td>
<td>Has an earthy smell. Can given light colored hair, an orange tint and treated skin may become more sensitive to sunlight.</td>
</tr>
<tr>
<td>3</td>
<td>Selenium sulfide</td>
<td>Dermatophytes/Yeast</td>
<td>Selsun, Excel</td>
<td>Can discolor hair blonde, gray or chemically colored hair.</td>
</tr>
<tr>
<td>4</td>
<td>Salicylic acid</td>
<td>Dermatophytes</td>
<td>Lonil T</td>
<td>Leaves scalp dry leading to more flaking</td>
</tr>
<tr>
<td>5</td>
<td>Ketoconazole</td>
<td>Deep Mycoses/Dermatophytes/Yeast</td>
<td>Nizoral</td>
<td>Nausea, Vomiting, Hepatitis, Loss of hair, rashes, doses higher than required for most fungi</td>
</tr>
<tr>
<td>6</td>
<td>Miconazole</td>
<td>Deep Mycoses/Dermatophytes/Yeast</td>
<td>-</td>
<td>Frequent hypersensitivity fever and chills, skin rash or itching.</td>
</tr>
<tr>
<td>7</td>
<td>Hydroxypyridones</td>
<td>Dermatophytes</td>
<td>Loporax</td>
<td>Itching</td>
</tr>
</tbody>
</table>
### Table no 2: Botanicals Used In Hair Care as Antidandruff

<table>
<thead>
<tr>
<th>Plants</th>
<th>Common Name</th>
<th>Family</th>
<th>Plant parts used</th>
<th>Remarks (pattern of using botanicals)</th>
<th>Figure</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Piper betle</em></td>
<td>Paan</td>
<td>Piperaceae</td>
<td>Leaf</td>
<td>Juice made from the leaves of Paan is used on the head.</td>
<td></td>
<td>Sensastri et al. (1996).</td>
</tr>
<tr>
<td><em>Hibiscus rosasinensis</em></td>
<td>Gurhal</td>
<td>Malvaceae</td>
<td>Flower</td>
<td>Latex obtained from ground flowers is Applied on the head as anti-dandruff.</td>
<td></td>
<td>Dey (1995).</td>
</tr>
<tr>
<td><em>Lawsonia inermis</em></td>
<td>Mehendi</td>
<td>Lythraceae</td>
<td>Leaf</td>
<td>Leaves are ground well to make juice with water and applied on the head.</td>
<td></td>
<td>Dey (1995).</td>
</tr>
<tr>
<td><em>Datura metel</em></td>
<td>Datura</td>
<td>Solanaceae</td>
<td>Fruit</td>
<td>Fruits are ground well with water. The paste is applied against dandruff</td>
<td></td>
<td>Dey (1995).</td>
</tr>
<tr>
<td><em>Mangifera indica</em></td>
<td>Mango</td>
<td>Anacardiaceae</td>
<td>Kernel</td>
<td>Kernels are ground and mixed with milk and used over head against dandruff</td>
<td></td>
<td>Dey (1995).</td>
</tr>
<tr>
<td><em>Nyctanthes arbor-tristis</em></td>
<td>Har singar</td>
<td>Oleaceae</td>
<td>Seed</td>
<td>Seeds are made powder and it is spread on the head</td>
<td></td>
<td>Borua (1995).</td>
</tr>
<tr>
<td>Camellia sinensis</td>
<td>Tea</td>
<td>Theaceae</td>
<td>Leaf</td>
<td>Leaves are boiled and applied on head after adding some lemon juice to prevent dandruff.</td>
<td>Conoras et al (2009)</td>
<td></td>
</tr>
<tr>
<td>--------------------</td>
<td>------------</td>
<td>----------</td>
<td>-------</td>
<td>--------------------------------------------------------------------------------------------</td>
<td>----------------------</td>
<td></td>
</tr>
<tr>
<td>Vitex negundo</td>
<td>Chaste Tree</td>
<td>Verbenaceae</td>
<td>Leaf</td>
<td>Juice from the leaves is mixed with oil and is applied on the head</td>
<td>Dey (2006)</td>
<td></td>
</tr>
<tr>
<td>Citrus aurantifolia</td>
<td>Nimbu</td>
<td>Rutaceae</td>
<td>Juice</td>
<td>Juice is mixed with castor oil and is used against dandruff</td>
<td>Chokroborti (1989)</td>
<td></td>
</tr>
<tr>
<td>Abhrak bhasma</td>
<td>Mica</td>
<td>-</td>
<td>Whole powered ash</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allium sativum</td>
<td>Garlic</td>
<td>Liliacea</td>
<td>-</td>
<td></td>
<td>Swarnlata Saraf et al (2011)</td>
<td></td>
</tr>
<tr>
<td>Plant Name</td>
<td>Common Name</td>
<td>Family</td>
<td>Part Used</td>
<td>Key Uses</td>
<td>Reference</td>
<td></td>
</tr>
<tr>
<td>---------------------</td>
<td>----------------------</td>
<td>-------------</td>
<td>---------------------</td>
<td>--------------------------------------------------------------------------</td>
<td>--------------------------------</td>
<td></td>
</tr>
<tr>
<td><em>Eclipta alba</em></td>
<td>Brhingaraj, False Daisy</td>
<td>Asteraceae</td>
<td>Petroleum ether extract of <em>Eclipta alba</em> can be used.</td>
<td>[Vyjayanthi et al. (2004)]</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Centella asiatica</em></td>
<td>Pennywort, jala brahmi</td>
<td>Apiaceae</td>
<td>-</td>
<td>-</td>
<td>[Vyjayanthi et al. (2004)]</td>
<td></td>
</tr>
<tr>
<td><em>Menthe piperita</em></td>
<td>Mint</td>
<td>Labiatae</td>
<td>-</td>
<td>-</td>
<td>[Singla Chavi et al. (2011)]</td>
<td></td>
</tr>
<tr>
<td><em>Cinnamomum camphora</em></td>
<td>Karpoor</td>
<td>Lauraceae</td>
<td>Oil</td>
<td>-</td>
<td>[Prabhamanju et al. (2009)]</td>
<td></td>
</tr>
<tr>
<td><em>Zingiber officinalis</em></td>
<td>Ginger</td>
<td>Zingiberaceae</td>
<td>Root extract</td>
<td>Root extract can be used for the treatment of dandruff</td>
<td>[Singla Chavi et al. (2011)]</td>
<td></td>
</tr>
<tr>
<td><em>Aloe vera</em></td>
<td>Aloe</td>
<td>Liliaceae</td>
<td>Juice</td>
<td>Juice can be applied.</td>
<td>[<a href="http://www.rootsherb.al.com">www.rootsherb.al.com</a>]</td>
<td></td>
</tr>
</tbody>
</table>
7. CONCLUSION

The awareness and need for cosmetics with herbs in on the rise, as it is strongly believed that these products are safe and free from side effects. For the treatment of dandruff we have both synthetic and natural herbal shampoos. But when compared to the chemical based shampoos, herbal based shampoos are more effective in terms of safety and ease of manufacturing and in the economic point of view they are cheap. Investigations have been carried out recently to develop totally herbal shampoos.
8. REFERENCES

12. Swarnlata Saraf et al,“formulation and evaluation of herbal shampoo containing extract of allium sativum”vol 02, issue no1, 2011, pg no: 18
