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Effect of *Ocimum sanctum* and *Azadiracta indica* on the formulation of antidandruff herbal shampoo powder

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Abstract

Now a day Herbal cosmetics are widely used when compared to synthetic cosmetics. In hair cosmetics, synthetic cosmetics lead to various side effects such as toxicity to eye, Over drying of hair and deposition of salt on hair shaft. Dandruff is a major problem in hair. In this study, the antidandruff herbal shampoo powder was formulated and evaluated various tests such as swelling index, foaming index, Antimicrobial activity and eye and skin irritation test etc. This study was designed to determine the antidandruff activity on the formulated herbal shampoo powder. The herbal shampoo powder was formulated using natural ingredients with *Ocimum sanctum* (Tulsi) and *Azadiracta indica* (Neem). Both are having antidandruff action. Thus the present study revealed that the antidandruff activity of *Ocimum sactum* and *Azadiracta indica* against strains of G + Organism, strains of G _ Organism and fungal organism such as candida albicans.

Key words: Herbal cosmetics, *Ocimum sanctum*, *Azadiracta indica*, antidandruff.

Introduction

In light of the recent development in scientific and technological world, even today herbs are widely used as remedial agents. India is one of the countries in this artificial world that which is rich in large varieties of medicinal plants. WHO currently encourages, recommends and promotes traditional (or) herbal remedies in National health care programs because such drugs are easily available at low cost and comparatively safe and the people have good faith in such remedies. Cleanliness of hair and scalp are among the most important personal grooming consideration today[1]. The emphasis placed on cleanliness is a relatively new cultural

phenomenon and shampoos have increased in importance beginning with soap based product and expanding as a growing number of synthetics become available.

In synthetic shampoos mainly anionic, cationic and non-ionic surfactants act as a principle surfactants. Anionic and cationic surfactants are having good foaming character and cleansing power. But they are not very much used and they are 'toxic' and cause damage to the eye[2]. Some shampoos cause irritation to the eye and a lasting corneal cloud. In hard water, the surfactants leave a deposit of sodium, calcium and magnesium salts on the hair shaft. So these synthetic shampoos are found to have side effects like drying effect on the hair. These shampoos leave the hair too dry to handle (or) comb. To avoid these problems, herbal shampoos will be useful[3].

Materials and Methods

Collection of plant material

The eleven plant materials reported in table No: 1 collected from agricultural medical college at Madurai District, Tamil Nadu. These plant materials were dried in shade powdered and stored in air tight containers until it was used for further studies.

Laboratory animals

Male albino rabbits of wistar strain weighing between 220- 250 were obtained from central animal facility (CAF), Indian institute of sciences, Bangalore.

Strains of antimicrobial activity

The G +ive Organism *Staphylococcus aureus* and G -ive Organism *E.coli* and fungal Organism Such as *Candida albicans* were obtained from Boss Laboratory, Madurai District, Tamil Nadu.

Method: The antidandruff herbal shampoo powder was formulated as shown in table No:1. The following steps are involved to prepare anti dandruff herbal shampoo powder.

Size reduction: The crude ingredients were collected and these ingredients were size reduced using hand driven mixer individually.

Mixing: All these fine ingredients were mixed thoroughly by mixer to form a homogenous fine powder.

Sieving: Then this fine powder was passed through sieve no.:80 and to get the sufficient quantity of fine powder.

Packing and labeling: Then it was packed and labeled suitably.

Evaluation of herbal powder shampoo

Solubility

Solubility is defined as the ability of the substance to soluble in a solvent. One gram of the powder is weighed accurately and transferred into a beaker containing 100 ml of water. This was

shaken well and warmed to increase the solubility. Then cooled and filter it, the residue obtained is weighed and noted.

Loss on drying

Loss on drying is the loss of mass expressed in percent m/m. Two gram of the powder was weighed accurately and transferred into a dry Petri dish. The Petri dish is placed in a dessicator for 2 days over calcium chloride crystals. Then the powder was taken and weighed accurately to find out the weight loss during drying.

Swelling index

The swelling index is the volume in milliliters occupied by one gram of a drug, including any adhering mucilage, after it has swollen in an aqueous liquid for 4 hour. Accurately weighed 1 g of the powder and transferred it into glass stopper measuring cylinder containing 25 ml of water. Then it is shaken thoroughly at every 10 minutes for 1 hour. After that it was kept for 3 hours at room temperature. The volume was measured in ml.

Angle of repose

It is defined as the maximum angle possible in between the surface of pile of powder to the horizontal flow.

Methods:

- i. Funnel method.
- ii. Open – ended cylinder method.

I Funnel method:

Required quality of dried powder is taken in a funnel placed at a height of 6 cm from a horizontal base. The powder was allowed to flow to form a heap over the paper on the horizontal plane. The height and radius of the powder was noted and recorded.

II Open - ended cylinder method:

Required amount of dried powder is placed in a cylindrical tube open at both ends is placed on a horizontal surface. Then the funnel should be raised to form a heap. The height and radius of the heap is noted and recorded.

For the above two methods, the angle of repose (θ) can be calculated by using the formula.

$$\theta = \tan^{-1}(h / r)$$

Where

θ – Angle of repose, h – Height of the heap, r – Radius of the base of the heap

Bulk density

Bulk Density is the ratio between the given mass of a powder and its bulk volume. Required amount of the powder is dried and filled in a 50 ml measuring cylinder up to 50 ml mark. . Then the cylinder is dropped onto a hard wood surface from a height of 1 inch at 2second intervals. The volume of the powder is measured. Then the powder is weighed. This is repeated to get average values. The Bulk Density is calculated by using the formulae.

$$\text{Bulk Density} = \frac{\text{Mass of the herbal powder shampoo}}{\text{Volume of the herbal powder shampoo}}$$

Foaming index

One gram of the powder was weighed accurately and transferred into 250 ml conical flask containing 100 ml of boiling water. Then it is warmed gently for 30 minutes, cooled and filtered and make up the volume to 100 ml in standard volumetric flask. This extract is taken in 10 test tubes in a series of successive portion of 1, 2, 3...10 ml and remaining volume is made up with water to 10 ml. Then the test tubes were shaken in longwise motion for 15 seconds at speed of 2 frequencies / second. Then the tubes are allowed to stand for 15 minutes. The height of the foam was measured.

Anti microbial activity***Anti fungal and anti bacterial activity:***

The anti fungal and anti bacterial activity of the extract of the herbal shampoo powder was studied

Standards used:

- Amikacin
- Ketoconazole

Anti bacterial activity:**Organisms used:**

- Gram Negative - E.coli
- Gram positive- Staphylococcus

Anti fungal activity:**Organisms used:**

- Candida albicans

Preparation of Agar plate:

Muller Hinton agar medium of 200 ml is prepared and sterilized by autoclave. Simultaneously Petri plates are sterilized in hot air oven at 160°C for 1 hour. The sterilized nutrient medium of 15ml is transferred to sterile Petri plate aseptically in a laminar air bench.

Let the vapour escape from the Petri plate and then closed the lid. This is allowed to solidify and incubated overnight at 37°C for 1 day to check free from bacterial contamination and 25°C in a B.O.D incubator for 2 days to check that they are free from fungal contamination. The contamination plates are rejected.

Cup-plate Method:

To a sterile Muller Hinton agar plate 50 µl of test organism is spreaded using sterile bud. The cups were made using sterile borer. These cups were filled with 200 µl herbal powder shampoo extract. Each cup can hold 200 µl of solution and the Petri plates are kept in refrigerator for 1

hour for the diffusion of the substance occurs from cup into surrounding medium. During this time the growth of organism is reduced after 1 hour plate was incubated in inverted condition. The Zone of inhibition was noted and sensitivity of culture was recorded.

Eye and skin irritation test

(a) Eye irritation test

Method: Draize and Kelly test

Group I: Leaved the eyes of this group unwashed

Group II: Washed the treated eye with 20ml of Luke warm water after 2 seconds of instillation.

Group III: Divided the 9 rabbits in 3 groups containing 3 rabbits in each group Instill 0.1ml of herbal extract in conjunctival sac of one eye of nine albino rabbit the other eye serves as a control Wash the treated eye with Luke warm water after 4 seconds of instillation. Read the ocular reaction with hand slit lamp for 7 days.

(b) Skin irritation test

A required amount of the herbal powder shampoo is rubbed in skin and the area is observed for any irritation or any inflammation.

Results and Discussion

Solubility test

The solubility test revealed that the powder shampoo powder comprises of mostly soluble ingredients which may be helpful in producing comfortable feeling while being mixed with water.

Angle of response

Good flow property is essential in formulation of any powder. The angle of response of herbal shampoo powder was $33^{\circ} 8'$. This confirms that the powder has good flow property.

Bulk density

The bulk density of the herbal shampoo powder was 0.397. This measurement indicates that the loose powder packing may be to the presence of large interparticle spaces.

Swelling index

These results showed that there was an increase in percentage of water absorption. This study confirms that the herbal shampoo powder was found to have good water retaining capacity. This is due to the presence of glycosides, glucose and saponins etc.

Foaming index

This results showed that the powder which is capable to produce high foaming property. This is due to the presence of soap nut is used as foaming agent which mainly consists of sapindoside A and B.

Anti microbial test

This test revealed the fact that the herbal shampoo powder produces zone of inhibition against G (+) ve, G (-) ve and fungal organisms. This confirms the shampoo extract have good Anti

microbial activity due to the presence of *Ocimum sanctum* (flavonoids), *Azadiracta indica* (Azadiractin) and little extent by *Acacia conicina* (saponnins), *Nelli* and *Hibiscus* (tannins).

Eye irritation and skin irritation test

The eye and skin irritation tests revealed that the herbal shampoo powder shows no harmful effect on skin and eye. This is due to the absence of synthetic surfactants. Most of the synthetic surfactants produce inflammation of the eyelid and corneal irritation. But in this formulation of herbal shampoo powder, the uses of all ingredients are obtained naturally. So it does not produce any harmful effect on skin and eye

Table1: Formulation of Antidandruff herbal shampoo powder

S.No	Ingredients	For 5gm
1.	Acacia concina	0.6 g
2.	Azadiracta indica	0.5 g
3.	Trigonella foenum graceum	0.5 g
4.	Lawsonia inermis	0.4 g
5.	Indigofera tinctoria	0.5 g
6.	Ocimum sanctum	0.5 g
7.	Phyllanthus emblica	0.4 g
8.	Hibiscus rosa sinensis	0.6 g
9.	Sapindus laurifolia	0.4 g
10.	Rosa centifolia	0.3 g
11.	Terminalia bellerica	0.3g

Table2: Muller Hinton agar media for antimicrobial activity

S.No	Ingredients	200ml
1.	Beef extract	2g
2.	Caesain acid	3.5g
3.	Starch	0.3g
4.	Agar	4.5g
5.	Distilled water	200ml

Table3: Determination of angle of repose of Antidandruff herbal shampoo powder

S.No.	Method	Height of the cone (h in cm)	Radius of the cone (r in cm)	$\tan \theta = (h/r)$	Average $\tan \theta$	$\theta = \tan^{-1}(h / r)$
1.	Funnel Method	2.5	3.8	0.6578	0.6727	33° 9'
		2.6	3.7	0.7027		
		2.5	3.8	0.6578		
2.	Open – ended cylinder Method	2.4	4.1	0.5853	0.6707	33° 8'
		2.6	3.5	0.7428		
		2.6	3.8	0.6842		

Table 4: Determination of Bulk density of Antidandruff herbal shampoo powder

S.No.	Bulk Volume (ml)	Mass of the powder (gm)	Bulk Density (gm / ml)	Average Bulk Density (gm / ml)
1.	47	18.4	0.3914	0.3971
2.	46	18.4	0.4	
3.	46	18.4	0.4	

Table 5: Determination of Foaming index of Antidandruff herbal shampoo powder (in mm)

T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉	T ₁₀
0	0	0	0.1	0.1	0.2	0.3	0.4	0.6	0.8

Note: T₁ - T₁₀ Test tube numbers 1 to 10

Table 6: Anti microbial activity

S.No.	Organism	Diameter of inhibition in mm
1.	Gram positive	18
2.	Gram negative	11

Table 6.1 Anti fungal activity

S.No.	Organism	Diameter of inhibition in mm
1.	<i>Candida albicans</i>	11

Fig 1: Anti microbial activity against G (-) organism

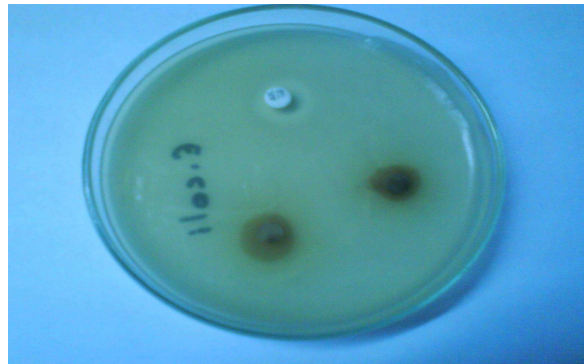


Fig 2: Antimicrobial activity against G (+) organism



Fig3: Anti fungal activity against *Candida albicans*



Conclusion

Results of present investigation has indicated the presence of antidandruff activity of the *Ocimum sactum* and *Azadirecta indica* mainly effective against strains of gram negative organism such as *E.coli* and gram positive organism such as *Staphylococcus* and fungal organism such as *Candida albicans*.The developed product has enhanced detergency, foaming action and particularly effective against dandruff also.

From this investigation it can be concluded that the formulation of anti dandruff herbal shampoo powder contain all good characters of an ideal shampoo and it was found to be harmless, more effective and economic.

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