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EVALUATION OF THE CHEMICAL COMPOSITION OF SOME COSMECEUTICAL PLANTS – A COMPARATIVE STUDY

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ABSTRACT
Cosmeceuticals' is fastest growing segment of the beauty industry. Herbs which are used for their medicinal values in the treatment of various systemic diseases are also used for alteration of appearance. In the present work, phytochemical screening of leaves of Aloe Vera. Azadirachta Indica and Leucas Aspera were done for the qualitative and quantitative analysis of various phytochemicals such as alkaloids, coumarins, saponins, flavonoids and steroids for their cosmetic potential. There is a lack of scientific analysis of phytochemicals used in cosmetic preparation so this work will provide a basis for the use of specific herbs and their efficacy as cosmetics.

KEYWORDS: Cosmeceuticals, phytochemicals, cosmetics, qualitative, quantitative.

INTRODUCTION

Cosmeceuticals are cosmetic-pharmaceutical products intended to improve the health and beauty by providing a specific result, The word "Cosmeceutical" means the cosmetic and drug, according to The drugs and cosmetic Act 1940 All medicines for internal or external use of human beings or animals and all substances intended to be used for; or in the diagnosis, treatment, mitigation or prevention of any disease or disorder in humans or animals" called drug and "Any article intended to be rubbed, poured, sprinkled or sprayed on or introduced into or applied to any part of the human body for cleansing, beautifying, promoting attractiveness or altering the appearance and includes any article intended for use as a component of cosmetic". For example, an antidandruff shampoo is a drug as well as is a cosmetic because its intended use is to clean the hair and also to treat dandruff. 'Cosmeceuticals' is fastest growing segment of the beauty industry.[1]

Generally, herbal extracts are a rich source of vitamins, antioxidants, essential oils, hydrocolloids, proteins, alkaloids, coumarins, saponins, flavonoids terpenoids and other bioactive compounds. According to their composition, these extracts can provide different properties like antioxidant activity, antimicrobial, anti-inflammatory, tyrosinase inhibition effect etc.[2]

Herbal cosmeceuticals have no side effects, these are environment friendly, safe to use and cheap also. Herbal cosmeceuticals have a great future ahead as compared to the synthetic cosmeceuticals. Proper regulation of herbs and standardization will lead to tremendous and significant growth in herbal cosmeceuticals field.[3]

MATERIALS AND METHODOLOGY

Fresh samples of Aloe Vera, Azadirachta Indica and Leucas Aspera leaves were collected from the local areas of Bilaspur region, Chhattisgarh, India. These plants were identified and authenticated at the Dept. of Botany, Dr. C.V. Raman University, Kota Bilaspur.

Sample Preparation

The ethanolic extracts of the eaves were prepared according to the method of Harbone JB (1998). Fresh samples (500g) of leaves were air dried and ground into powder. The ground sample was soaked in ethanol and water in the ratio 8:2 (v/v) and left for 24h. The mixture was filtered and the filtrate was concentrated by evaporation at 400^0C.[4]

Determination of Phytochemicals[5]

Alkaloid Determination: 5 g of the each sample was weighed into a 250 ml beaker and 200 ml of 20% acetic acid in ethanol was added and covered to stand for 4h. After filtration the extract was concentrated using a water bath to one-quarter of the original volume. Concentrated ammonium hydroxide was added drop wise to the extract until the precipitation was complete. The whole solution was allowed to settle and the precipitate was collected by filtration and weighed.

Tannin Determination: 500 mg of the sample was weighed into 100 ml plastic bottle. 50 ml of distilled water was added and shaken for 1 h in a mechanical shaker. The content was filtered into a 50 ml volumetric flask and made up to the mark. Then 5 ml of the filtrate was pipette out into a tube and mixed with 3 ml of 0.1 M $FeCl_3$ in 0.1 N HCl and 0.008 M potassium ferrocyanide. The absorbance was measured in a spectrophotometer at 120 nm wavelength. A blank sample was prepared using tannin acid, the colour developed at the same wavelength.

Determination of total Phenols: For the extraction of Phenolic component, the sample was boiled with 50 ml of ether for 15 min. 5 ml of the extract was pipette into a 50 ml flask, then 10 ml of distilled water was added. 2 ml of ammonium hydroxide solution and 5 ml of concentrated amyl alcohol were also added. The samples were made up to mark and left to react for 30 min for colour development. The absorbance of the solution was read using a spectrophotometer at 505 nm wavelengths.

Flavonoid Determination: 10 g of the plant samples were extracted repeatedly with 100 ml of 80% aqueous methanol at room temperature. The whole solution was filtered through Whatman filter paper no.42. The filtrate was later transferred into a crucible and evaporated to dryness over a water bath and weighed.

Determination of Riboflavin: 5 g of the sample was extracted with 100 ml of 50% ethanol solution and shaken for 1h. This was filtered into a 100 ml flask; 10 ml of the extract was pipette into 50 ml volumetric flask. 10 ml of 5% potassium permanganate and 10 ml of 30% H_2O_2 were added and allowed to stand over a hot water bath for about 30 min. 2 ml of 40% sodium sulphate was added. This was made up to 50 ml mark and the absorbance measured at 510 nm in a spectrophotometer.

Determination of Thiamin: 5 g of the sample were homogenized with ethanolic sodium hydroxide (50 ml). It was filtered into a 100 ml flask. 10 ml of the filtrate was pipette and the colour developed by addition of 10 ml of potassium dichromate and read at 360 nm. A blank sample was prepared and the colour also developed and read at the same wavelength.

Determination of Niacin: 5 g of the sample was treated with 50 ml of 1 N sulphuric acid and shaken for 30 min. 3 drops of ammonia solution were added to the sample and filtered. 10 ml of the filtrate was pipette into a 50 ml volumetric flask and 5 ml potassium cyanide was added. This was acidified with 5 ml of 0.02 N H_2SO_4 and absorbance measured in the spectrophotometer at 470 nm wavelengths.

Determination of Ascorbic Acid (Vitamin C): 5g of the sample was weighed into an extraction tube and 100 ml of EDTA/TCA (2:1) extracting solution were mixed and the mixture shaken for 30 min. This was transferred into a centrifuge tube and centrifuged at 3000 rpm for about 20 min. It was transferred into a 100 ml volumetric flask and made up to 100 ml mark with the extracting solution. 20 ml of the extract was pipette into a volumetric flask and 1% starch indicator was added. These were added and titrated with 20% $CuSO_4$ solution to get a darkened point.

Table 1: Phytochemical composition of Aloe Vera, Azadirachta Indica and Leucas Aspera expressed as mg/100 g dry weight.

Phytochemicals	Aloe Vera	Azadirachta Indica	Leucas Aspera
Alkaloids	1.65 ± 0.11	1.60 ± 0.02	1.25 ± 0.11
Flavonoids	1.85 ± 0.20	1.75 ± 0.12	1.75 ± 0.20
Phenols	1.74 ± 0.02	1.84 ± 0.11	1.64 ± 0.02
Tannins	1.95 ± 0.1	1.90 ± 0.20	1.55 ± 0.1
Saponin	22.50 ± 0.20	20.20 ± 0.20	14.50 ± 0.20

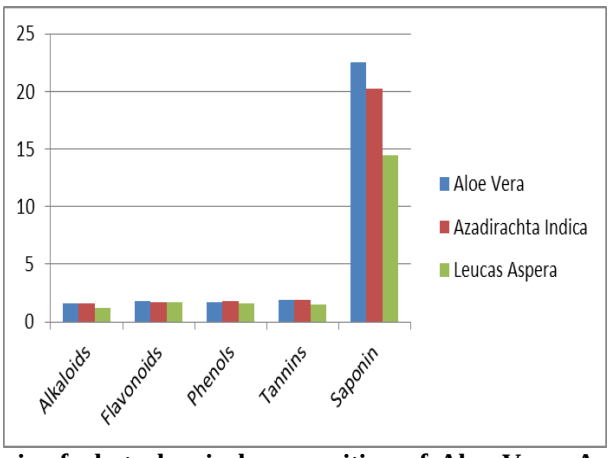

Figure 1: Comparative analysis of phytochemical composition of Aloe Vera, Azadirachta Indica and Leucas Aspera.

Table 2: Vitamin composition of Aloe Vera, Azadirachta Indica and Leucas Aspera on mg/100g dry weight.

Vitamin	Aloe Vera	Azadirachta Indica	Leucas Aspera
Ascorbic acid	48.50 ±0.10	42.04 ±0.20	30.05±0.10
Riboflavin	0.30±0.01	0.52 ±0.10	0.25±0.10
Thiamine	0.20 ±0.20	0.21 ±0.02	0.15±0.02
Niacin	0.10 ±0.11	0.08 ±0.10	0.06±0.10

RESULTS AND DISCUSSION

The quantitative determination of phytochemical constituents of Aloe Vera, Azadirachta Indica and Leucas Aspera were summarized in Table 1. High quantity of flavonoids and alkaloids were found on Aloe Vera Azadirachta Indica and Leucas Aspera. Flavonoids are natural antioxidants, effective in preventing free radical formation by scavenging them or promoting their decomposition and suppressing disorders.[6] Some compounds inhibit the initiation or propagation of oxidative chain reactions, thus preventing or repairing oxidative damage done by body's cells promoted by oxygen. Phenolic rich plants could be used, for prevention of skin, harmful effects of UV radiation.[7]

High quantity of Saponins was found on all the plant leaves studied. Saponins enable high skin surface activity, which gives witch hazel its cleansing function-removing dirt and oil from the skin surface. It is also known to boost skin hydration, as well as treat razor burns and sunburns.[8]

These plants are good sources of ascorbic acids, riboflavin, thiamin and niacin (Table 2). Natural ascorbic acid is playing a key role in the anti aging process for skin reducing wrinkles and an aged appearance, vitamin C also protects skin against toxins and free radicals. Plus, it helps to reducing inflammation.

CONCLUSION

This study, therefore, has provided some biochemical basis for the cosmeceutical use of these plants in the treatment and prevention of infections. As rich source of phytochemicals and vitamins Aloe Vera Azadirachta Indica and Leucas Aspera can be a potential source of useful drug as well as cosmetic and can be use as cosmeceutical.

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