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Comparative Study of Medicinal Plants in Skin Care

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Abstract: ***Natural skin care methods are always a top priority among people. Dryness, wound and infections greatly affect the skin health. The different bioactive compounds in plant make them one of the best choices for healthcare, especially skin care. The evaluation of the plant phytochemicals makes us understand the properties of the plant extract in health care. Ethanol extracts of four plant species namely, Aloe Vera, Ocimum sanctum (Tulsi), Azadirachta indica (Neem) and Curcuma longa (Turmeric) were obtained and subject to phytochemical and antioxidant analysis. The test for the presence of various phytochemicals like tannins, saponins, carbohydrates, steroids, terpenoids, alkaloids and flavonoids has been done using distinct test methods for each bio active compound. Oxidation reaction is responsible for many skin consequences and ageing. Hence, the study of antioxidant properties of plants is of great importance for their use in skin care. The antioxidant properties of the ethanol extract of the 4 samples chosen were evaluated using DPPH assay. The results obtained were compared and tabulated. It revealed that maximum activity was exhibited by Azadirachta indica.***

Keywords: Skin care, Phytochemicals, Antioxidant property

I. INTRODUCTION

Our skin is a reflection of our lifestyle. Skincare has become a challenge for the population due to imbalanced diet, environmental pollution, occupational stress, and different communicable and non- communicable disease states. Dryness of skin and microbial infection has been the top causes for skin related problems. The prevention or treatment of the aforesaid causes along with rejuvenation of skin can greatly impact its health. The increased concern about skin health among people has led to the extensive use of various skincare products. The demand for more products with enhanced and specialized properties has also risen. Natural formulations have been one of the most sought after products in the market due to their effective actions with very less/no side effects. Traditional methods and formulations of skincare have always got special importance in Indian society. The availability, freshness, ease of preparation, and household methods of preparation are all important aspects of traditional herbal formulation methods. The insight of viewing traditional knowledge as key for modern well-being has increased the fascination towards studying their scientific background. Scientific proof and a better understanding of the judicial use of these resources that are present among us for more than 5000 years' can improve the cosmetics market. Herbs have been the key ingredients for almost all traditional-natural formulations. Most of the well-known herbs possess impressive antimicrobial, antioxidant and wound healing properties. The unique and diverse range of phytochemicals present has led to the usage of various medicinal plants for many specific treatments.

Aloe Vera, *Ocimum sanctum* (Tulsi), *Azadirachta indica* (Neem) and *Curcuma longa* (Turmeric) are an integral part of Indian households. They are being used for their beneficial properties in health care. They are also commonly used in traditional skincare practices due to their moisturizing, antimicrobial, antioxidant, and wound healing properties. *Aloe vera* is reportedly used in wound healing and skin regeneration [1]. Continuous application of *Aloe vera* gel has been reported to enhance skin integrity, decreased appearance of fine wrinkling, and decreased erythema [2]. *Ocimum sanctum* (Tulsi) is found to be useful in the management of abnormal healing such as keloids and hypertrophic scars. Studies also suggest that they possess effective anti-bacterial and inflammatory activity [3]. The antimicrobial, anti-carcinogenic and antioxidant activity of extracts of different parts of *Azadirachta indicia*(Neem) has extensively been reported. Clinical studies with the dried neem leaf extract have proven its efficiencyin curing ringworm, eczema and scabies[4]. Almost every Indian household has a great influence of *Curcuma longa* (Turmeric). Studies have shown that, curcumin, the compounds that give turmeric their characteristic color, also possess satisfactory anti-inflammatory and anti-oxidant properties [5].*Ubtan,* an herbal paste, is a traditional skin remedy. It is said to be one of the oldest cosmetics with turmeric as one of the key ingredients. Reports also show that turmeric also helps in regulating sebum secretion [6]. They also exhibit antioxidant and antipyretic properties. A study of these abundant household herbs in skin care based on their phytochemicals and properties is discussed extensively and a comparative analysis is represented in this article.

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II. MATERIALS AND METHODS

A. Sample Collection

The plant samples such as Aloe Vera, *Ocimum sanctum*, *Azadirachta indica*, *Curcuma longa* were collected in and around Madurai, Tamilnadu, India. The leaves and rhizome of the plants are rinsed thoroughly in the laboratory. The details of plant and their parts taken for the study are represented in Table 1.

B. Preparation Of Solvent Extract

The collected plant parts were cleaned and cut into smaller portions and were dried under shade for three weeks. The dried plants were reduced to a fine powder by mechanical grinding. Extraction was done by collecting 5gm of fine powder of each plant sample and mixing it with 50ml of ethanol as solvent. The mixture was kept in the shaker for 48hrs. Then the product was filtered. The filtrate was dried to concentrate the samples. The residual powder was weighed and re-dissolved in the respective solvents to get a final concentration of 1mg/ml. [7]

C. Phytochemical Analysis

The phytochemical analysis was carried out for ethanol extracts of Aloe Vera, Tulsi (*Ocimum sanctum*), Neem (*Azadirachta indica*), Turmeric (*Curcuma longa*) to find the presence of various functional groups and chemical compounds. The ethanol extracts were subjected to the following tests.

1) *Carbohydrate:* Molisch test: To identify the presence of carbohydrates 3ml of ethanol extract was taken, 2ml of molisch reagent was added to itand was shaken well.To which few drops of concentrated H_2SO_4 were added. The formation of a violet ring at the interphase confirmed the presence of carbohydrates. [8]
2) *Tannins:* To 2ml of ethanol extract, 2ml of distilled water and few drops of $FeCl_3$ was added. The formation of green precipitate indicated the presence of tannins. [8]
3) *Saponins:* To 5ml of ethanol extract, 5ml of distilled water was added. The mixture was warmed and the formation of stable foam indicated the presence of saponins. [8]
4) *Steroids:* To 2ml of ethanol extract, 2ml of chloroform and 2ml of concentrated H_2SO_4 were added. The formation of a red color ring indicated the presence of steroids. [8]
5) *Terpenoid:* To 4ml of ethanol extract, 0.5ml of acetic anhydride, 0.5ml of chloroform and add few drops of concentrated H_2SO_4were added. The formation of a red-violet ring indicated the presence of terpenoid. [9]
6) *Alkaloids:* Alkaloids are naturally occurring nitrogenous compounds. Few ml of ethanol extract was taken in a test tube to which few drops of Meyer's reagent was added. The formation of white yellow precipitate indicated the presence of alkaloids.[10]
7) *Flavanoid:* To 4ml of extract, 1.5ml of 50% methanol was added. To the warm solution metal Mg was added. To this few drops of concentrated HCl is added. The formation of red color indicates the presence of flavanoids. [11][12][13]

D. Determination Of Antioxidant Activity

A quantitative analysis of total antioxidant activity of the plant extract was done and expressed in terms of equivalents of ascorbic acid.

The radical scavenging activity of different extracts was determined by using DPPH assay according to Chang et al. method. Different concentrations i.e., 100mg and 200mg of plant extracts were taken and diluted with 2ml of ethanol. To this 2ml of DPPH was added and incubated in dark at room temperature for 30 minutes. And then the OD was measured at 520 nm using UV spectrophotometer and ascorbic acid as standard.

The experiments were performed in triplicates. The higher free radical scavenging activity can be inferred from decreasing absorbance of the mixture corresponding to the intensity of DPPH quenching of the plant extract. The control was DPPH in ethanol. The difference in absorbance of the test sample to the control was calculated and expressed in (%). The assay was calculated using the following equation.

$$\%\ \boldsymbol{scavenging} = \frac{\boldsymbol{Absorbance\ of\ control\ -\ absorbance\ of\ test\ sample}}{\boldsymbol{absorbance\ of\ control}} * \mathbf{100}$$

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III. RESULT AND DISCUSSION

Plants exhibit medicinal properties due to the presence of different phytochemicals and anti-oxidants. The traditional medicines and cosmetics majorly involve plant extracts which are rich source of various organic compounds. The antioxidant activity of the extracts enables them to act as natural wound healers and rejuvenators. Hence, this study provides a comparative analysis of phytochemicals and anti-oxidant activity of 4 extensively found medicinal herbs in India.

A. Phytochemical Analysis

The ethanol extracts of leaves and tubers of afore mention plant parts were subjected to different phytochemical tests to evaluate the presence of phytochemical. The preliminary phytochemical analysis of the ethanol extracts of *Azadirachtaindica, Aloe Vera, Curcuma longa* and *Ocimum sanctum* are represented in Table 2. It depicts that ethanol extract of leaves and tubers was found to show the presence of tannins and saponins in all plant samples that were tested. Alkaloids and terpenoids were found in ethanol extracts of all plants tested except *Azadirachta indica*. Similarly, flavonoids and carbohydrates were found to be absent in the ethanol extracts of *Ocimum sanctum* but present in other samples. Steroids were absent in the ethanol extract of tubers of *Curcuma longa* and were found to be present in other leaf extracts tested.

B. Antioxidant Activity

DPPH radical scavenging assay is one of the widely used methods for studying the antioxidant activity of samples. 1, 1 Diphenyl 2-PicrylHydrazylis a stable free radical due to the delocalization of the spare electron over the molecule as a whole, so that the molecules do not dimerise. This accounts for the deep violet colour, characterized by an absorption band in ethanol solution centered at about 520 nm. When scavenged there is change in colour to yellow due to the reduction of DPPH by antioxidants. The degree of discoloration indicates the scavenging potential of the antioxidant compounds or extracts in terms of hydrogen donating ability (DPPH paper). The extracts of leaf and tubers as mentioned above were assayed for antioxidant activity using DPPH and the results are depicted in Table 3. From the results it inferred that there is no significant difference in antioxidant activity due to variation in extract concentration, i.e 100 mg and 200 mg. On comparing the antioxidant activity of the four different samples used it is observed that the leaves of *Azadirachta indica* showed the greatest activity in both the extract concentrations assayed. Following it the tubers of *Curcuma longa* and leaves of *Ocimum sanctum* showed significant antioxidant activity. Among the samples used for comparison, *Aloe vera* leaves showed least activity in both extract concentrations taken for assay.

Healthy modern lifestyle is influenced by traditional medicinal knowledge with proper scientific insights. In this study we have analyzed the phytochemicals present in four different plant species namely *Aloe vera, Ocimum sanctum, Azadirachta indica and Curcuma longa.* The presence of different phytochemicals in medicinal plants is responsible for enhancing their biological activities such as antimicrobial, antioxidant, anti-inflammatory, anticarcinogenic etc. They also rejuvenate the skin and catalyze wound healing. Anti-oxidants reportedly reduce inflammation and aid in skin repair. From the results of anti-oxidant activity assay we can conclude that these medicinal plants can be used to maintain healthy and youthful skin.

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TABLES

Table 1

Name of The Plant	Plant Part Collected
Aloe Vera	Leaf
Ocimum sanctum	Leaf
Azadirachtaindica	Leaf
Curcuma longa	Tuber

TABLE 1: Plant parts used for study

Table 2:

PLANT USED / VARIABLE	*Azadirachtaindica* (leaves)	*Aloe Vera* (leaves)	*Curcuma longa* (tuber)	*Ocimum sanctum* (leaves)
TANNIN	+	+	+	+
ALKALOIDS	-	+	+	+
FLAVONOID	+	+	+	-
TERPENOIDS	-	+	+	+
STEROIDS	+	+	-	+
SAPONINS	+	+	+	+
CARBOHYDRATES	+	+	+	-

+ INDICATES PRESCENCE; - INDICATES ABSENCE

TABLE 2: Phytochemical analysis of Ethanol extracts of medicinal plants

Table 3

S.NO	PLANT USED	ANTIOXIDANT ACTIVITY (%)	
		CONCENTRATION OF EXTRACT 100 mg	CONCENTRATION OF EXTRACT 200 mg
1.	*Aloe vera*	40	45
2.	*Ocimum sanctum*	56	62
3.	*Azadirachtaindica*	68	70
4.	*Curcuma longa*	58	60

TABLE 3: Antioxidant assays of ethanol extracts of medicinal plants

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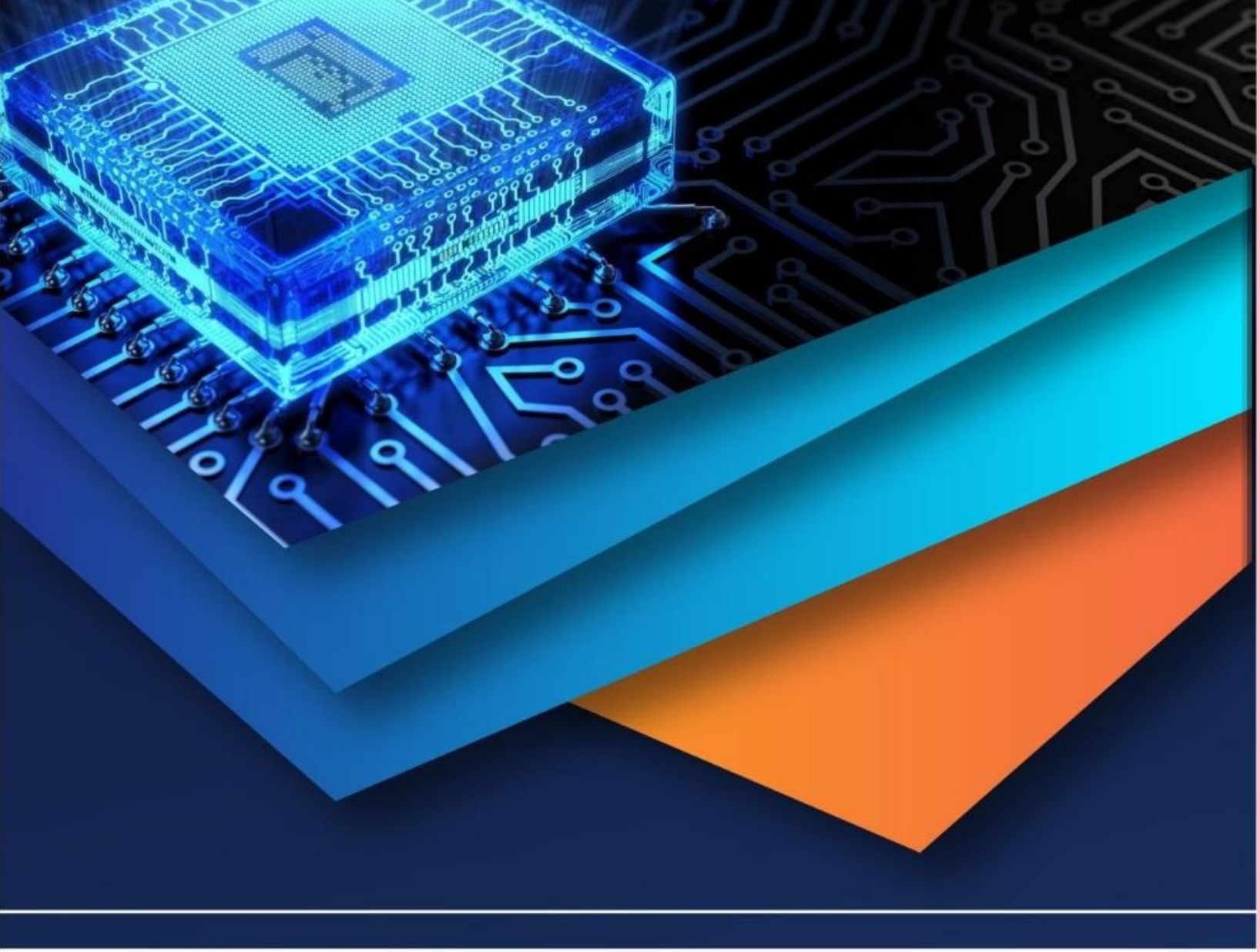

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