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Research Article

Comparative Effect of Datura Metel Leaf and Flower Extracts for Hair Formulations

Livingstone Udofia, Folashade Oyedeji*

Department of Chemistry, University of Ibadan, Ibadan, Nigeria

ABSTRACT

This study was designed to evaluate and compare the properties of Datura metel leaf and flower extracts for hair cosmetic formulations. The plant reportedly has wide range therapeutic effect for treating ailments and skin infections. In this study, dried and pulverized Datura metel leaves and flowers were both successively extracted using n-hexane and methanol, and then characterized. Methanolic leaf extract had the highest percentage recovery yield (23.5%). Chemical analysis of both sets of extracts revealed the presence of Alkaloids, Saponins, Tannins, Flavonoids, Phenols, Glycosides and Reducing sugars. The methanolic portions contained steroid compounds in the flowers but not in the leaves while Terpenoids were absent in the flowers but present in the leaves. FTIR manual peak results suggest that the leaf extracts contain more of the same bioactive compounds than the flowers. Animal treatments with methanol leaf extract initiated the fastest hair growth in 5 days, and the shaved areas were completely filled with hairs in 13 days. Hexane flower extracts produced the longest regrowth hairs (80.6%) after 30 days. The experiments clearly demonstrate that D. metel leaves and flower extracts, when mixed together in aliquots, can provide much improved hair growth formulations.

Keywords: Datura metel; Methanol; N-hexane

INTRODUCTION

IMedicinal plants have varieties of biologically active chemical compounds that work synergistically together and which is a direct result of natural selection process [1]. This chemical diversity also includes many compounds that have beneficial value to various animal models and humans as: vitamins, nutrients, antioxidants, anti-carcinogens, anti-inflammatory, antimicrobial, antidiabetic, antispermatogenic, immunomodulatory, and even reno-protection or hepato-protective effects [2]. These compounds are mostly secondary metabolites also called bioactive compounds such as alkaloids, steroids, tannins, saponins, terpenoids, phenols, flavonoids and cardiac glycosides which are capable of producing definite physiological action on the human body [3]. Terpenoids are known to define the taste or smell of a natural product, but they also produce anti-inflammatory, antibacterial, anti-depressant and sedating effects to distinguish between a skin care product, that is active or not. Alkaloids and saponins have effects on ammonia emission in animal feeding, on blood cholesterol levels, stimulation of the immune system and they are known to possess both microbial and anti-inflammatory activities. Tannins are known to either stimulate or suppress unusual hair growth, among other anti-microbial and antiviral effects [4].

With newer discoveries in herbal medicine, the use of chemicals and synthetic products in cosmetic formulations is becoming even less popular due of their rising costs and associated side effects [5]. Presently, treatment of skin conditions and a wide variety of dermatological disorders, including inflammation, phototoxicity, psoriasis, atopic dermatitis and alopecia, by plants extracts have attracted numerous research interests due to their potential successes in standing up to the scrutiny of 2 clinical trials and pharmacological testing hair growth promoters. Many products in various combinations of herbal formulations are presently available in the market as hair tonic, hair growth promoters, hair conditioners, hair-cleansing agents, antidandruff agents, as well as for the treatment of other skin infections [6]. Another emerging trend in the use of plant extracts are those involving mixtures with foods supplements called nutritional pharmaceuticals (nutraceuticals), which are benign for hair growth and can be applied for both oral and topical preparations [7,8]. However, substantial improvement is still needed in their development; potential plant extracts must be adjured to be relatively safe (Figure 1).

Correspondence to: Folashade Oyedeji, Department of Chemistry, University of Ibadan, Ibadan, Nigeria, E-mail: livingstone.udofia@gmail.com

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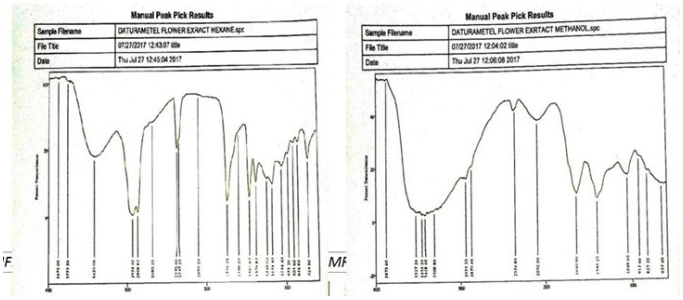

Figure 1: FTIR Spectra of Datura metel leaves and flower extracts

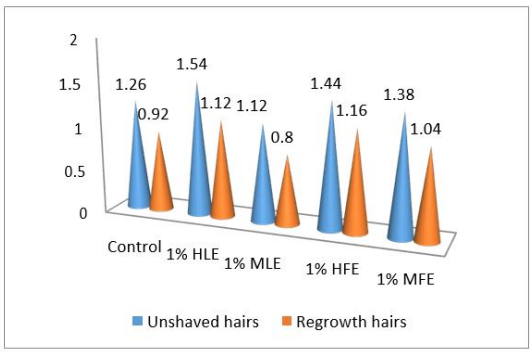

Figure 2: Average hair lengths of treated animals after 30 days.

Datura metel (Gegemu) is a green leafy and important medicinal plant which thrives in rich and moist, or very alkaline soil and has the capacity to re-seed itself. In Nigeria, the two known varieties of the plant have white and purple flowers, and are found in the Southern Nigeria. The leaves and flowers are known to contain varying amounts of poisonous alkaloids, depending on the soil and weather conditions in which the plant grows flora Datura poisonous datura flora alkaloids, and which could be beneficial hair restoration treatments. In this study, the effect of the leaves and flowers of Datura metel were investigated using n-hexane and methanol as extracting solvents.

MATERIALS AND METHOD

Sample collection and preparation

Fresh leaves and flowers of Datura metel collected from wastelands in Ibadan, Southwest Nigeria were washed and rinsed with clean water and then, air dried for 3 weeks. The dried samples were ground to powder, using an Electric Blender and kept in a dry place. Methanol and n-Hexane, used in this study were of analytical grade.

Extraction of samples

100 g of the ground flower sample was soxhlet extracted with n-hexane for 6 hours, then taken off and air-dried. The dry marc was extracted again with methanol until exhausted. The same process was repeated with the pulverized leaf samples. A rotary evaporator was used to recover both solvents and the extracted samples were kept for further analysis.

Phytochemical screening

Identification of phytochemical constituents present in the flower and leaf extracts under study were carried out using standard procedures described by Uddin.

Test for glycosides

Five ml each of various extract were hydrolysed separately with 5 ml each of conc. HCl and boiled for few hours on a water bath and hydrolysates were subjected to the following test: A small amount of alcoholic extract of samples was dissolved in 1ml water and then aqueous 10% sodium hydroxide was added. Each extract was hydrolyzed with HCl and neutralized with NaOH solution. A few drops of Fehling solution A and B were added. Formation of a yellow colour indicated the presence of glycosides (Figure 2).

Test for saponins

0.5 g of various solvent extract was dissolved in boiling water in a test tube. Test cooling aqueous extracts were mixed vigorously to froth and the height of the froth was measured to determine the saponin contents in the sample. 2.0 g of the powdered plant material was boiled in distilled water in a test tube in boiling water bath and filtered. 10 ml of the filtrate was mixed with 5 ml of distilled water and was observed when shaken vigorously. The formation of stable persistent froth during concentration of samples on a rotatory evaporator and which when shaken vigorously gave an emulsion was indicative of saponins.

Animal studies

Identification of phytochemical constituents present in the flower and leaf extracts under study were carried out using standard procedures described by Uddin

CONCLUSION

The medicinal tendencies of Datura metel leaves and flowers towards wide-range applications; treatment of diseases, skin care and other health related problems have been far-reaching, due to their large store of active secondary metabolites. It is clear that methanolic leaf extract initiates very fast hair growth and hexane flower extracts prompt the growth of longer and denser hairs. The FTIR spectra of the leaves and flowers using the same type of extracting solvent tend to have very close distribution of bioactive components. The extracts have complementary effects in inducing hair regrowth and did not cause any irritation on the skins of the albino rat model. It remains to be seen how much D. metel leaves and flower extracts can be optimized in a single mixture for hair formulations. Ethanol can also be a useful extracting solvent to affect the growth of dense, coarse and hard hairs without adverse effects.

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