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### *Terminalia catappa*: A potential herb to promote hair growth, preliminary preclinical study

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#### ABSTRACT

Hair loss problem is of great significance to both men and women. The essential issues associated with hair loss are hair fading, dandruff, and falling of hair. Alopecia is the medical term for hair loss or baldness. It is an embarrassing condition for any person as he/she looks extra aged than ordinary. Many forms of medication are available to treat alopecia in special procedure of medication such as Allopathic, Homeopathic, and Ayurveda or can also be surgical like hair transplantation; however, none of them is wholly ample. This hindrance could be solved by the use of natural medicines obtained from herbs. *Terminalia catappa* Linn belongs to the family Combretaceae and is popularly known as 'deshi badam'. It is a well known herb in Ayurvedic system of medicine. Almost all the parts of *Terminalia catappa* were significantly employed in various ailments. The seed extract of *Terminalia catappa* was claimed to have hair growth promotion property. Current study was conducted with an aim to evaluate the hair growth promotion activity of ethanolic seed extract of *Terminalia catappa*. The extract was mixed in coconut oil, applied on the shaved area of rats and qualitative hair growth analysis was undertaken by observing hair growth initiation time (Minimum time taken to initiate hair growth on denuded skin region), hair growth completion time (Minimum time taken to completely cover the denuded skin region with new hair) and mean hair length were measured. 2% Minoxidil was used as reference control and all the test drugs were applied once daily for 30 days. Ethanolic seed extract of *Terminalia catappa* significantly decreased the time taken for initiation of hair growth and hair growth completion time. *Terminalia catappa* significantly increased mean hair length size compared to vehicle treated. From the result it was concluded that *Terminalia catappa* promotes the hair growth in animal model.

**Keywords:** *Terminalia catappa*, Minoxidil, Hair growth Promotion and mean hair length

## INTRODUCTION

Hair loss is a disorder in which the hair falls out from skin areas where they are usually present, such as the scalp and the body. This loss interferes with the many useful biologic functions of the hair, including sun protection (mainly to the scalp) and dispersal of sweat gland products. As hair cover to the scalp has psychological importance in our society, patients with hair loss suffer tremendously. In 2015, a population-based study in India showed 58% AGA in males aged 30–50 years [1]. Male pattern baldness is found to be associated with various cardiovascular disorders and metabolic syndromes. The incidence of hair loss may increase upto 65% in 2020 due to the interrelated cardiovascular disease with metabolic syndrome [2]. Though hair loss (alopecia) is not a debilitating or life threatening sickness, the very thought of becoming bald can lead to emotional stress and traumatic experience for those who suffer from premature or excessive hair loss. Minoxidil (useful in both male and female pattern baldness) and Finasteride (useful in male pattern baldness) are two US FDA-approved synthetic drugs finding concomitant use for treatment of androgenic alopecia, but their side effects have reduced their usage [3]. The side effects associated with the use of these synthetic compounds include erythema, scaling, pruritus, gynaecomastia, dermatitis, itching or skin rash. To manage the unsafe of modern medicine for hair loss, its necessary to look into the nature's treasure and found a number of herbs with proven records for the treatment of alopecia. Being natural drugs there are many advantages of using them like patient compliance, less side effects and more than one mode of action for treatment of alopecia.

*Terminalia catappa* Linn belonging to the family Combretaceae, is distributed in the warmer parts of India. It is also known as Indian almond, Malabar almond, and tropical almond [4] The various extracts of leaves and bark of the plant have been reported to be anticancer, antioxidant [5], hepatoprotective [6], anti-inflammatory [7], aphrodisiac [8], antimicrobial [9] and nephroprotective [10]. The fallen leaves of *Terminalia catappa* have been used in the management of sickle cell disorders [11]. The moderate consumption of the seed kernel is useful in the treatment of men with sexual dysfunctions, primarily from premature ejaculation [8]. Meanwhile,

*Terminalia catappa* Linn, a medium sized tree has been identified with potent antioxidant activity which has been exploited as curative agents against a number of pathological conditions. Its fruits have been used for the treatment of asthma and diabetes [12]. Nuts are very nutritious and contain a significant amount of high-quality proteins and vital minerals [13]. The oils extracted from seeds were used to improve hair growth and the nuts are good sources of edible oils and fats. Considering the significance, it was decided to study the hair growth promotion activity of seed oil in rats.

## MATERIALS AND METHODS

### Collection and Authentication

The seeds of *Terminalia catappa* was collected from outskirts of Pondicherry. The seed was identified as *Terminalia catappa* and authenticated by the botanist, Botanical Survey of India, Agricultural University, Coimbatore. The voucher specimen (BSI/SRC/11/72/2017-18/Sci/01342) has been deposited in the herbarium for future reference.

### Extraction

The seeds of *Terminalia catappa* were dried at shade at room temperature, pulverized by a mechanical grinder and sieved through 40 mesh. The powdered materials were extracted with 70% ethanol using Soxhlet extraction apparatus. The extract was concentrated under reduced pressure using rotary evaporator. The ethanol free semi-solid mass thus obtained was stored in air-tight container and used for further studies.

### Animals

Wistar albino rats of either sex, weighing between 160 - 180 gm were used for this study. The animals were obtained from animal house, of Sri Lakshmi Narayana Institute of Medical Sciences, Puducherry. The animals were placed at random and allocated to treatment groups stainless steel cages. Animals were housed at a temperature of  $24\pm 2^{\circ}\text{C}$  and relative humidity of 30 – 70 %. A 12:12 light: day cycle was followed. All animals were allowed to free access to water and fed with standard commercial pelleted rat chaw (M/s. Hindustan Lever Ltd, Mumbai). All the experimental procedures and protocols used in this study were reviewed by the Institutional Animal Ethics Committee.

## Hair Growth Promotion Study

Wistar albino rats were divided into 3 groups of 6 rats each. The hairs from 3 sq cm area of dorsal side of the animal were removed using commercially available hair remover cream. Group I was kept as control topically applied with coconut oil. Group II was served as reference control topically applied with 1 ml of 2 % Minoxidil solution and the group III was topically applied with ethanolic seed extract of *Terminalia Catappa*. All the test drugs were topically applied over the shaved area, once a daily for 30 days.

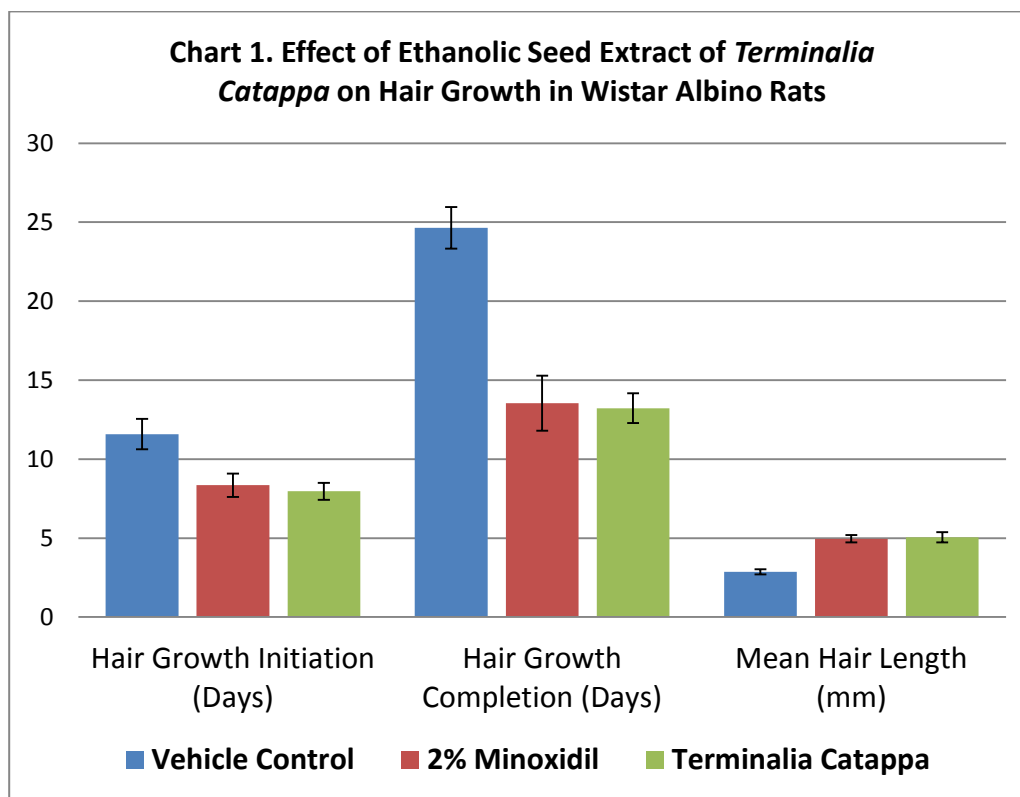
## RESULTS

## Assessment of Hair Growth

Qualitative hair growth analysis was undertaken by observing hair growth initiation time (Minimum time taken to initiate hair growth on denuded skin region), hair growth completion time (Minimum time taken to completely cover the denuded skin region with new hair) and mean hair length [14].

## Statistical Analysis

Results were expressed as mean  $\pm$  SEM. The data were analyzed by using one way analysis of variance (ANOVA) followed by Dunnett's 't' test using Graph Pad version 3. P values < 0.05 were considered as significant.



The effect of ethanolic seed extract of *Terminalia catappa* was studied for its hair growth promotion activity in wistar rats and the results were shown in Chart 1. The test drugs and *Terminalia catappa* seed extract were applied on the shaved area for 30 days and hair growth initiation time, hair growth completion time and mean hair length were measured. Time taken for initiation of hair growth was reduced by both reference control Minoxidil and

*Terminalia catappa* seed extract significantly compared to vehicle control. There was also significant decrease in the days to cover the denuded skin region with new hair with both Minoxidil and *Terminalia catappa*. The mean hair length was significantly enhanced by the reference control Minoxidil and *Terminalia catappa* seed extract.

## CONCLUSION

From the result, it was concluded that, ethanolic seed extract of *Terminalia catappa*, has proved its hair growth promotion activity in the preliminary study. Further study has to be conducted to isolate the

phytochemical constituents which is responsible for the hair growth promotion and to evaluate the exact mechanism of activity of this nature's wonder plant *Terminalia catappa*.

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