Indonesian plants potentially to be used as the hair growth promoting agent

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Abstract

Traditional hair care using ingredients from plants has been practiced for a long time by local people in many countries, including Indonesia. However, biological-pharmaceutical scientific research has only flourished in the last two decades. This article presents the results of research conducted by students and researchers in Indonesia. There are dozens of types of plants in Indonesia that are known to have the potential to be developed as hair growth-promoting drugs. Even so, there are still many weaknesses in the research process that must be overcome so that the validity of the information on the efficacy of these plants in overcoming the problem of hair loss can be relied on.

Keywords: Alopecia; Hair Growth; Minoxidil; Hair Health; Hair Beauty

1. Introduction

Although technology in the field of cosmetics and medicine is now very developed, many people still suffer from distress due to alopecia [1]. That is why many people are willing to spend a lot of money to care for and maintain the beauty of their hair [2]. The high public interest in maintaining the health and beauty of hair is what drives researchers and hair care practitioners around the world to keep looking for anti-hair loss [3]. So far, the standard drugs that have been proven to be most effective in preventing hair loss are minoxidil and finasteride [4]. However, these two types of drugs have side effects that limit their pharmacological benefits, so it is necessary to find natural substitutes for these synthetic drugs [5].

In the last decade there has been a lot of pharmacological research on the hair-growth promoting activities of plant extracts using test animals and even man. Among the plants that have been tested for their pharmacological effects on hair growth by researchers in various developing countries are Hibiscus rosa sinensis and Calotropis gigantea [6], Naringi crenulata [7], Glycyrrhiza glabra L (Fabaceae) [8], Cucurbita pepo L[9], Centella asiatica, Cyperus rotundus and Emblica officinalis [10].

From South Asia alone, Gupta et al. (2010) found dozens of herbs/plants that indicated to have anti-hair loss effects including Emblica officinalis (Euphorbiaceae), Eclipta alba Linn. (Asteraceae), Cocos nucifera Linn (Palmae), Eucalyptus globules (Myrtaceae), Lawsonia inermis (Lythraceae), Azadirachta indica (Meliaceae), Hibiscus rosasinensis (Malvaceae), Nardostachys jatamansi (Valerianaceae), Juniperus virginiana, Rosmarinus officinalis Linn. (Labiatae), Acacia concinna (Mimosaceae), Prunus dulcis (Rosaceae), Ginko biloba (Ginkgoaceae), Santalum album (Santalaceae), Sesamum indicum (Pedaliaceae), Cassia angustifolia (Leguminousae), Citrus limonum (Rutaceae), Rosa damascena (Rosaceae), Salvia officinalis Linn.(Labiatae), Arnica montana (Ariaceae), Simmondsia chinensis (Simmondiaceae), Trigonella foenum-graecum L (Fabaceae), and Ocimum sanctum (Labiatae) [11].
What chemicals in plants have biological activity in promoting hair growth? From a variety of literature review, Semwal et al. (2011) found there are dozens of phytochemical suspected effects on hair growth, including saponin, alkaloids, ecliptine, wedelic acid, luteolin, triterpine, glycosides, β- sitosterol, hentriacontanol, vitamin A, vitamin C, iron calcium oxalic, malic acid, α pinene, β pinene, fatty acid, sterol compounds, polyphenols, steroids, volatile oil and essential oil [12].

In Indonesia, the use of natural ingredients for hair growth has been traditionally practiced by local people for a long time. However, scientific pharmacological researches on the efficacy of natural ingredients in overcoming hair loss and baldness have only been carried out massively recently. The results of research by students and researchers in the biology-pharmaceutical field on the efficacy of various types of plants to promote hair growth and fertility in Indonesia in the last two decades are presented in this article.

2. Indonesian herbs expected to be hair growth promoting agent

As in other countries in the South-East Asia region, in Indonesia there are also dozens of plant species that deserve to be proposed as natural ingredients for hair health care. The list of plant species that have been studied for their properties in promoting hair growth is presented in Table 1.

Table 1 List of plants expected to be efficacious in promoting hair growth

<table>
<thead>
<tr>
<th>No</th>
<th>Plant species</th>
<th>Subject tested</th>
<th>Results</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Morinda citrifolia L.</td>
<td>Flemish giant rabbits</td>
<td>At the concentration of 25% fruit extract of Morinda citrifolia promote hair growth beyond standard hair tonic</td>
<td>[13]</td>
</tr>
<tr>
<td>2</td>
<td>Hibiscus sabdariffa, rosella plant</td>
<td>Women (human)</td>
<td>Rosella flower hair tonic provides a better hair loss reduction effect than Ginseng hair tonic (positive control) in women</td>
<td>[14]</td>
</tr>
<tr>
<td>3</td>
<td>Northopanax scutellarius</td>
<td>White rabbits</td>
<td>The extract of N. scutellarius give effect up to 85% of hair growth in rabbits compared to the positive control.</td>
<td>[15], [16]</td>
</tr>
<tr>
<td>4</td>
<td>Camellia sinensis</td>
<td>Rabbits, Lepus sp.</td>
<td>Plant leaf extract of Camellia sinensis significantly promote hair growth in rabbit</td>
<td>[17]</td>
</tr>
<tr>
<td>5</td>
<td>Anredera cordifolia (Ten.) Steenis</td>
<td>Female rabbits, Oryctolagus cuniculus</td>
<td>Gel containing 25% Anredera cordifolia leaves extract most effective in promoting hair growth</td>
<td>[18]</td>
</tr>
<tr>
<td>6</td>
<td>Peperomia pellucida L.</td>
<td>Male rabbits, Oryctolagus cuniculus</td>
<td>Topical gel containing plant extracts of P. pellucida leaves extract most effective in promoting hair growth</td>
<td>[19]</td>
</tr>
<tr>
<td>7</td>
<td>Aloe vera and Apium graveolens L.</td>
<td>Wistar rats, Rattusnorvigicus</td>
<td>The combined extract of two plants causes growth rate of 0.32 mm/day</td>
<td>[20]</td>
</tr>
<tr>
<td>8</td>
<td>Capsicum frutescent, chili pepper</td>
<td>Rabbits, Oryctolagus cuniculus</td>
<td>Plant leaf extract of chili pepper promote hair growth better than that of Aloe vera hair tonic.</td>
<td>[21]</td>
</tr>
<tr>
<td>9</td>
<td>Kalanchoe pinnata</td>
<td>Male rabbits, Oryctolagus cuniculus</td>
<td>At the highest concentration, promoting activity of leaf gel extract of Kalanchoe pinnata surpassed minoxidil.</td>
<td>[22]</td>
</tr>
<tr>
<td>10</td>
<td>Hibiscus tiliaciusL and Tamarindus indica L.</td>
<td>Male rabbits</td>
<td>The effect of the combined extracts of the two plants is close to the effect of minoxidil</td>
<td>[23]</td>
</tr>
</tbody>
</table>
11. *Carica papaya* L. Male rabbits, *Oryctolagus cuniculus*  
Gel extract of *Carica papaya* seeds at a concentration 15% significantly promote hair growth but not the hair mass. [24]

12. *Aloe vera*  
*Rattus norvegicus*  
No significant effect of *Aloe vera* extract on hair growth [25]

13. *Ipomoea aquatic* Forsk  
Male rabbits (New Zealand White strain)  
Hair tonic contained 5% leaf extract of *Ipomoea aquatic* effectively promote hair growth in rabbits. [26]

Male rats, *Rattus norvegicus*  
Combined extract 3 plants: (1) change the color of hair (2) increase growth of hair follicles (3) cause hyperkeratosis and hypergranulosis in epidermal tissues [27]

15. *Vigna sinensis* L and *Apium graviolens* L.  
Male rabbits  
Combined extract of two plants increases hair length up to 23 mm in 35 days. [28]

16. *Capsicum annum* Var. *Abbreviata*  
Albino mice  
Gel fruit extract of gendon chili in concentration of 5% increase hair growth in mice [29]

17. *Amaranthus tricolor*  
*Rattus norvegicus*  
The plant extract of *Amaranthus tricolor* promote hair growth of rabbits in a concentration-related manner [30]

18. *Momordica charantia*  
Male rats  
Plant extract of *Momordica charantia* exceeds the effect of standard drug minoxidil. [31]

19. *Etlingera elatior* (Jack) R.M.Sm  
Male rabbits  
Leaf extract of *Etlingera elatior* at a concentration of 10% effectively promote hair growth in 28 days [32]

20. *Averrhoa bilimbi*  
Male rabbits, *Lepus nigricollis*  
Administration of the *A. bilimbi* extract doubling hair growth compared to the control [33]

### 3. Critical issues of the research findings

Although there have been dozens of studies in Indonesia that report the types of plants that are worthy of being recommended as drugs to promote hair growth, the results of these studies still require further study. First of all, the preparations used are generally still in the form of crude extracts. This condition certainly cannot be used as a basis for ascertaining the type of compound that actually has activity on the physiological process of hair growth. Next, the study only focused on growth parameters in the form of hair length and/or mass. Meanwhile, the cellular aspects of the epidermis and hair follicles have not been studied in detail.

Furthermore, there are still results that contradict the claims of previous researchers that the plant is very good for use as a hair growth-promoting herb. This, for example, can be seen from the research results of Masyithoh *et al.* (2019) which got results that *Aloe vera* did not show any significant difference in promoting hair growth. While the claims of traditional communities and the findings of previous researchers, actually recommend *Aloe vera* as the best hair growth promoting agent. Differences in research results with standard claims indicate something is wrong in the research process. It may be related to the formulation of the research problem or the materials and tools used are not appropriate.

### 4. Conclusion

Despite the many weaknesses in the applied testing techniques, pharmacological research conducted in Indonesia in the last two decades still has benefits in the search for plants for anti-alopecia drugs. At least, there are dozens of types
of plants that grow in Indonesia, both native and exotic, which are known to have the potential to be developed as drugs to promote hair growth.

**Compliance with ethical standards**

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Author declared there is no competing interest.

**References**


