



ORIGINAL ARTICLE

Comparative Study of the Online Over-The-Counter Hair Loss Products

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Abstract

Background: There are tremendous amount of the over-the-counter (OTC) hair loss products available online and widely purchase all over the world by many consumers. We conducted this study to evaluate some popular and widely used OTC hair loss products that are introduced by famous online retailer websites.

Methods: We identified the top selling hair loss products using data introduced by some online retailers such as Amazon, Etsy, Bonanza and Overstock. All products data were obtained from the retailers' websites and were compared for their type and active ingredients.

Results: Most of hair loss products are natural products, vitamins, minerals, amino acids and proteins. The products found in the top sellers are different between the online retailers regarding their type, side, dosage forms and prices. Minoxidil, the only FDA approved OTC hair loss drug, is found only in the list of top seller of Amazon.com.

Conclusions: Many of the OTC hair loss treatments were natural products with very few evidences about their efficacy. The OTC hair loss products nearly costs the same as the FDA approved drug, minoxidil.

Keywords

Hair loss products, Over-the-counter (OTC), Online retailers

Introduction

Hair follicles are highly complex dynamic skin extension. They consist of both epithelial and mesenchymal tissues. The follicle stem cells are engaged in hair production and help to produce the important materials needed for hair division and differentiation. The follicle dermal papilla cells are found at the follicle tip supply

all the nutrients needed for hair growth form the capillaries [1].

Hair is one of the most important human feature as it produced many important jobs in our body as physical protection, thermoregulation, sweat production, sensation, production and secretion of sebum and pheromones and finally it has social and sexual communication [2]. Hair thinning and loss are highly spread in adults and represent a deep psychosocial problem associated with decreased quality of life. Causes of hair loss include androgenetic alopecia, nutritional deficiency, hormonal causes, inflammation, genetic factors and environmental factors [3].

Psychological effects of hair loss push patients to search for any available treatment in either medical providers or marketplace. However, only two medications have been approved by the American Food and Drug Administration (FDA), minoxidil and finasteride. Minoxidil is available in the over-the-counter (OTC), while finasteride is obtained only through prescription. In addition, many OTC hair loss products are available in markets and in the online retailers. Most of these products are natural products. There is great lack of clinical evidences about the efficacy of these natural products. Therefore, this study was conducted to investigate some widely used OTC hair loss products from famous online retailers and to evaluate the data supporting their use.

Materials and Methods

Online retailer websites



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During April 2019, a list of top selling hair loss products were obtained from the major online retailers. We accessed the following online retailer websites:

- Amazon.com
- eBay.com
- Folksy.com
- Gumtree.com
- Etsy.com
- Preloved.com
- Rakuten.com
- Overstock.com

The retailer websites regularly provide an updated list of the top selling products and publish it to be available to public.

Data collection

Data from the top fifty products were collected including all dosage forms as shampoos, conditioners, foams, oils, serums and oral supplements. The data collected included:

- Active ingredients
- Quantity

- Price
- Customers review on the product

Statistical analysis

The percent of occurrence was used to describe data. Excel 2013 was used for all statistical evaluation.

Results

During April 2019, we tried to obtain the top selling list of hair loss products from the online retailer websites. We found that some websites did not provide top seller list such as eBay.com. Other websites did not purchase hair loss products as Folksy.com Gumtree.com and Preloved.com.

Hair loss products in Etsy.com

There are over than one hundred of hair loss products found in Etsy.com, while the top selling list contains only five products. All the five products are topically used and made of a mixture of natural products or vitamins. The characteristics of the active ingredients in these products were summarized in [Table 1](#).

Hair loss products in Overstock.com

There are only ten hair loss products in Overstock.com. They are all topically used products. All products

Table 1: Common active ingredients found in the top selling hair loss products in Etsy.com.

Active ingredient	Number of products (%)	Available formulations	Monthly coast
Botanicals			
Castor oil	1 (20%)	Topical	17.42\$
Coconut oil	2 (40%)	Topical	8.5-17.42\$
Nettle leaf	1 (20%)	Topical	22\$
Neem leaf	2 (40%)	Topical	8.5-22\$
Saw Palmetto	1 (20%)	Topical	17.5\$
Cedar wood	1 (20%)	Topical	8.5\$
Rosemary	2 (40%)	Topical	8.5-25\$
Jjoba oil	1 (20%)	Topical	17.5\$
Clove	1 (20%)	Topical	25\$
Lemon	1 (20%)	Topical	25\$
Cinnamon	1 (20%)	Topical	25\$
Eucalyptus	1 (20%)	Topical	25\$
Vitamins			
Vitamin E	2 (40%)	Topical	17.42-17.5\$
Folic acid	1 (20%)	Topical	17.5\$
Thiamin	1 (20%)	Topical	17.5\$
Niacin	1 (20%)	Topical	17.5\$
Minerals/Elements			
Zinc oxide	1 (20%)	Topical	17.5\$
Iodine	1 (20%)	Topical	17.5\$
Others			
Hyaluronic acid	1 (20%)	Topical	17.5\$
Collagen	1 (20%)	Topical	17.5\$

Table 2: Common active ingredients found in the top selling hair loss products in Overstock.com.

Active ingredient	Number of products (%)	Available formulations	Monthly coast
Botanicals			
Cacao	1 (10%)	Topical	91.78\$
Loquat leaf	1 (10%)	Topical	21.41\$
Fo-Y	1 (10%)	Topical	21.41\$
Licorice	1 (10%)	Topical	21.41\$
Eucalyptus	2 (20%)	Topical	21.41-40\$
Horse Chestnut	1 (10%)	Topical	21.41\$
Peppermint leaf	4 (40%)	Topical	17.90-40\$
Nettle leaf	1 (10%)	Topical	27.05\$
Ginseng	2 (20%)	Topical	17.29-27.05\$
Aloe	2 (20%)	Topical	20.47-40\$
Camphor	2 (20%)	Topical	20.47-40\$
Castor oil	2 (20%)	Topical	17.29-20.47\$
Caffeine	1 (10%)	Topical	17.29\$
Orange/Lemon	1 (10%)	Topical	17.29\$
Kernel	1 (10%)	Topical	17.29\$
Ginger	1 (10%)	Topical	17.29\$
Bergamot	1 (10%)	Topical	17.29\$
Vitamins			
Biotin	2	Topical	17.49-21.41\$
Amino acids and proteins			
Hydrolyzed proteins	3	Topical	17.29-40\$

Table 3: Common active ingredients found in the top selling hair loss products in Bonanza.com.

Active ingredient	Number of products (%)	Available formulations	Monthly coast
Botanicals			
Beta sitosterol	2 (4%)	Topical-Oral	32.83-71.62\$
Rosemary	7 (14%)	Topical	15.39-100.35\$
Aloe	10 (20%)	Topical	20.93-100.35\$
Coconut	8 (16%)	Topical	13.19-31.64
Nettle	2 (4%)	Topical	32.83-45.13\$
Saw palmetto	7 (14%)	Topical-Oral	11.14-97.65
Jobba oil	7 (14%)	Topical	13.18-31.85\$
Argan oil	12 (24%)	Topical	8.96-48.15\$
Shea butter	5 (10%)	Topical	24.99-31.85
Caffeine	7 (14%)	Topical-Oral	7.62-97.65\$
Barbadensis	9 (18%)	Topical	11.14-100.35
Green tea	3 (6%)	Topical	23.54-31.85
Vitamins			
Biotin	16 (32%)	Topical-Oral	11.14-48.15
Vitamin E	7 (14%)	Topical-Oral	13.82-71.62
Vitamin C	4 (8%)	Topical-Oral	13.82-33.29
Vitamin B6	3 (6%)	Topical-Oral	17.18-48.15\$
Folate	9 (18%)	Topical-Oral	17.18-48.15\$
Pantothenic acid	7 (14%)	Topical-Oral	14.57-32.83\$
Minerals			
Magnesium	3 (6%)	Oral	17.18-32.83\$
Zinc	2 (4%)	Oral	17.18-32.83\$

Amino acids and proteins			
Keratin fiber	10 (20%)	Topical	15.39-37.18\$
Hydrolyzed proteins	5 (10%)	Topical	20.93-100.35\$
Amino acids	2 (4%)	Topical	20.93-29.17\$

Table 4: Common active ingredients found in the top selling hair loss products in Amazon.com.

Active ingredient	Number of products (%)	Available formulations	Monthly coast
Minoxidil	14 (28%)	Topical	10.33-145.79
Botanicals			
Tea tree	4 (8%)	Topical	5.98-28.75
Jobba oil	8 (16%)	Topical	5.98-42.99
Argan oil	8 (16%)	Topical	5.98-37.99
Saw Palmetto	8 (16%)	Topical-Oral	9.88-88.00
Caffeine	4 (8%)	Topical	18.99-29.98
Nettle	3 (6%)	Topical-Oral	9.66-42.99
Coconut	8 (16%)	Topical	6.23-42.99
Castor oil	7 (14%)	Topical	13.75-25.99
Aloe	5 (10%)	Topical-Oral	9.48-28.75
Green tea	4 (8%)	Topical-oral	6.23-42.99
Rosemary	5 (10%)	Topical	6.23-42.99
Peppermint	3 (6%)	Topical	25.99-42.99
Grape	3 (6%)	Topical-Oral	10.99-42.99
Vitamins			
Biotin	19 (38%)	Topical-Oral	5.98-88.00
Vitamin A	6 (12%)	Topical-Oral	8.15-88.00
Vitamin B	5 (10%)	Topical-Oral	15.00-39.97
Vitamin C	4 (8%)	Topical-Oral	21.99-39.97
Vitamin D	4 (8%)	Topical-Oral	8.15-88.00
Vitamin E	3 (6%)	Topical	15.00-28.75
Minerals			
Zinc	7 (14%)	Topical-Oral	5.98-88.00
Calcium	3 (6%)	Topical-Oral	8.15-39.97
Amino acids and proteins			
Keratin	10 (20%)	Topical-Oral	15.00-37.91
Collagen	2 (4%)	Oral	21.99-88.00
Amino acids	2 (4%)	Oral	39.97-88.00

composed of a mixture of natural compounds, vitamins and hydrolyzed proteins. The common active ingredients of the products were summarized in [Table 2](#).

Hair loss products in Bonanza.com

Bonanza.com contain hundreds of hair loss products. We collected the data of the top fifty best seller products. There top fifty products were either topical or oral. They mainly depends on natural products, vitamins, minerals, amino acids and proteins. The most used ingredient are biotin (32%), argon oil (24%), keratin fiber (20%) and aloe (20%). The characteristics of active ingredients of these products were summarized in [Table 3](#).

Hair loss products in Amazon.com

For the first time, top fifty seller products contains minoxidil and represents about 28% of the products. Other products include natural products, vitamins, mineral, amino acids and proteins. The most used ingredients were biotin (38%) and keratin (20%). The characteristics of the common active ingredients of the products were summarized in [Table 4](#).

Discussion

Most of the top selling hair loss products in the online retailers' websites are natural products or a mixture of vitamins and minerals. Only Amazon.com offered minoxidil in its top seller list. The top selling products, which contain natural plant based

compounds with very few evidences about their efficacy. However, consumers are purchasing these compounds with the hope of reducing their hair loss.

Minoxidil was first discovered in 1970. It is a potent vasodilator and used for treatment of hypertension. Later, many trials described the ability of minoxidil to potentiate hair growth and reported complain of hirsutism in women. The topical form of minoxidil was developed and approved by United States FDA for treatment of androgenetic alopecia. It is the only OTC hair loss product that is approved by FDA in both sexes. The top selling list of Amazon.com is the only one that contain products with minoxidil as active ingredient. There are two available concentration, 2% and 5% to be used topically once or twice daily. The 2% solution exhibited significant elevation in the hair count compared with placebo in both men and women [4]. Minoxidil is used for treatment androgenetic alopecia, alopecia areata and contact dermatitis [5,6].

The majority of OTC hair loss products from online websites were plant based compounds. Many of these compounds were used due to their anti-inflammatory, anti-androgenic and pro-circulatory effects. One of the most used compound is argan oil, which is found in the majority of OTC products from all online retailers. There is only one published study discussed its efficacy [7]. Moreover, only one study assessed the effects of coconut oil on hair damage. It reduces protein loss in both damaged and undamaged hair [8]. Finally, there is no published study about the therapeutic effects of aloe, castor oil and jojoba oil in hair loss.

The other plants found in OTC hair loss products have very few published works discussing their therapeutic effects. One widely used plant is saw, which is an extract of berries tree. The tree extract or oil is rich in fatty acids (85%-90%). It also contains beta sitosterol responsible for the inhibition of 5-alpha-reductase. Similar to finasteride, it inhibits 5-alpha-reductase preventing conversion of testosterone to dihydrotestosterone responsible for androgenetic alopecia [9]. Green tea is found in many OTC hair loss products. It is full of antioxidant compounds such as polyphenols and flavonoids. One of these compounds is epigallocatechin gallate (EGCG). Green tea produced anti-inflammatory effects as well as reducing stress improving hair growth. In addition, EGCG produced proliferative and antiapoptotic effects on dermal papilla cells. Furthermore, EGCG inhibits 5-alpha-reductase activity enhancing the hair growth [10]. Rosemary is also used in some OTC hair loss products. It contains many natural antioxidant ingredients. It was previously compared with 2% minoxidil and produced similar effects after 6 months in humans [11]. Similar to minoxidil, it improves blood circulation leading to regeneration of follicles. Finally, caffeine represents a potential treatment of alopecia. Caffeine is a phosphodiesterase inhibitor that increases

cyclic adenosine monophosphate level inside hair follicles promoting hair growth [12]. Caffeine enhances the elongation of hair shaft stimulates the proliferation of hair matrix [13].

Vitamins, particularly biotin, was widely used in hair products depending on data about low biotin levels in hair loss patients. However, the data of the value of oral biotin or the topical treatments containing biotin are very low. In addition, except for pregnant women, biotin deficiency is very rare as its synthesized in the bacterial flora of the human intestine as well as it is found in a wide range of food sources. There are about eighteen studies in PubMed about therapeutic usefulness of biotin in hair growth [14]. While appropriate consumption of biotin in diet leads to healthy hair, little data support the role of biotin in healthy individuals. Another vitamin used is vitamin E. There is a randomized-controlled trial of vitamin E supplementation. The authors found about 34.5% increase in the count of hair in volunteers treated with vitamin E as compared with those treated with placebo [15].

There are many minerals like zinc, copper, calcium and iron were found in the top seller OTC hair loss products. Although, alopecia is a common sign of zinc deficiency [16], no data assures the role of zinc in treating hair loss. However, many studies showed no significant correlation between zinc and alopecia as compared with control subjects [17,18]. There were a study of fifteen alopecia patients treated with 50 mg zinc gluconate for 12 weeks. The results show improvement in nine of them [19]. Other mineral is iron. Iron deficiency is very common in women with hair loss [20]. However, the relation between hair loss and serum iron or ferritin is a source of debate for years.

Finally, treating hair loss needs the patients to use the products for duration of one year to decades. The top selling OTC hair products costs 5-100\$ monthly, about 60-1200\$ per year. The only approved OTC hair product minoxidil costs almost the same amount of money with proved evidence of its efficacy in treating hair loss.

Conclusion

Many of the OTC hair loss treatments found in the best seller lists of the online retailers website were natural products with very few evidence about their efficacy. These products costs about the same as minoxidil. Therefore, more studies should be done to evaluate the effect of these natural products.

Funding Resources

None.

Conflicts of Interest

None.

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