Effects of hair ampoules containing L-Menthol, Salicylic acid, and Dexpanthenol on scalp and hair

Seon-Hee You[1], Na-Yeon Kim[2*]
[1]Professor, Department of Beauty Stylist Major in Skin Care, Yeonsung University
[2]Adjunct Professor, Department of Beauty Care, Yongin Arts & Science University

L-Menthol, Salicylic acid, Dexpanthenol을 함유한 헤어 앰플이 두피 및 모발에 미치는 영향

유선희[1], 김나연[2*]
[1]연성대학교 뷰티스타일리스트과 스킨케어전공 교수, [2]용인예술과학대학교 뷰티케어과 겸임교수

Abstract In this study, it is intended to provide basic research data on hair loss and problematic scalp that is expanding to lower age groups and women. When using Company B's hair ampoule containing L-Menthol, Salicylic acid, and Dexpanthenol daily for women in their 20s with problematic scalp, the effect on the scalp and hair after 4 weeks was investigated. As a result of this study, when using Company B's ampoule containing L-Menthol, Salicylic acid, and Dexpanthenol, the subjects showed improvement effects such as relieving inflammation, reducing scalp fever and erythema, reducing itching and hair loss, and increasing hair thickness. In addition, it was confirmed that the scalp self-diagnosis of the subjects showed improvement effects on scalp satisfaction, scalp vitality and elasticity, heat generation, scalp pulling after cleaning, and itching. Through these research results, it is believed that products containing L-Menthol, Salicylic acid, and Dexpanthenol will help improve problematic scalp and hair.

Key Words : Hair ampoule, Hair loss, Problematic scalp, L-Menthol, Salicylic acid, Dexpanthenol

요 약 본 연구에서는 낮은 연령층과 여성에게도 확대되고 있는 탈모와 문제성 두피에 대한 기초 연구자료를 제공하고자, 문제성 두피를 가진 20대 여성을 대상으로 L-Menthol, Salicylic acid, Dexpanthenol이 함유되어 있는 B사의 헤어 앰플을 매일 사용하였을 때, 4주 후 두피 및 모발에 미치는 영향을 알아보고자 하였다. 본 연구 결과, L-Menthol, Salicylic acid, Dexpanthenol이 함유되어 있는 B사의 앰플을 사용하였을 때 연구 대상자들의 두피 상태가 실험 전에 비하여 염증 완화, 두피 열 및 홍반 감소, 가려움증과 모발 빠짐 감소, 청결해진 모공 상태, 모발 굵기 증가 등 개선 효과를 보였으며, 연구 대상자들의 두피 자가진단을 통해 실험 전과 후의 두피 만족도, 두피 생기와 탄력, 열 발생도, 세정 후 두피 당김, 가려움증에 대한 개선 효과가 나타났음이 확인되었다. 이와같은 연구 결과를 통하여 L-Menthol, Salicylic acid, Dexpanthenol이 함유된 제품이 문제성 두피 및 모발 개선에 도움이 될 것으로 사료되어 진다.

주제어 : 헤어앰플, 탈모, 문제성 두피, 엘-멘톨, 살리실산, 덱스판테놀

1. Introduction

Modern society is interested in beauty based on health, not appearance due to economic development and improvement of living standards. Recently, people are interested in not only skin but also scalp and hair care[1]. Hair health is not directly related to life, but it protects the scalp from ultraviolet rays and

external stimuli and is an important factor in expressing external images[2]. Recently, due to various causes such as hair stress procedures, wrong shampoo method, uncleanness of the scalp, and chemical exposure, hormonal abnormalities, traction alopecia, weakening of health, stress, drugs, and heredity, hair extinction accelerates abnormally in the normal scalp, and the number of people suffering from problematic scalp such as hair loss, boredom, and dandruff is increasing[3,4]. Although the causes of hair loss, dandruff and seborrheic vary from person to person, they are mostly compounded by various factors[5,6]. In particular, the wrong use of shampoo leaves sebum, sweat, fine dust, and aging keratin in the pores, and contaminants accumulating around the pores and scalp layer interfere with the growth of new hair, leading to hair loss, seborrheic, and dandruff[7]. Recently, symptoms of hair loss, seborrheic and dandruff scalp are not limited to men, but also spread to women and lower age groups, making the problematic scalp more serious[8]. If this problematic scalp is neglected and not managed or treated, it may not be a direct cause of the problematic scalp, but may be the biggest cause of natural hair loss and problematic scalp[9].

Currently, there are L-Menthol, Dexpanthenol, biotin, zincpyritione and zincpyritione (50%) which are known by the ministry of food and drug safety in korea to help alleviate hair loss symptoms. Among them, L-Menthol, Salicylicacid, and Dexpanthenol are the main components of company B's products used in this study. L-Menthol is an organic compound obtained from peppermint or other mint oil[10]. Dexpanthenol is a derivative of pantothenic acid and is known to help tissue or cell regeneration. Salicylic acid is extracted from willow bark, birch, etc. and is used as an anti-inflammatory agent because

salicylic acid is a derivative of aspirin, that is, salicylate. It has an anti-inflammatory effect by influencing the chain reaction of arachidonic acid in the stratum corneum. In addition, salicylic acid is lipid-soluble and can penetrate into pores[11].

Accordingly, this study provides basic research data on hair loss and problematic scalp that is expanding to lower age groups and women. The effect on the scalp and hair was investigated using a hair ampoule from Company B containing L-Menthol, Salicylic acid, and Dexpanthenol in women in their 20s with problematic scalp.

2. Research Method

2.1 Subjects and Periods of Study

Six women in their 20s living in Gyeonggi Province with problematic scalp were selected for the study.
From April 10, 2021 to May 7, 2021, self-management was conducted once a day, and the sensitivity, opening and closing conditions of pores, and thickness of hair were taken four times a week.

2.2 Questionnaire composition

The questionnaire written in this study was produced by referring to the existing prior papers and research, and reconstructed by referring to the prior research by Lee(2015)[12]. A total of 39 questions consisting of 11 lifestyle questions, 8 scalp cleaning methods, 4 scalp self-diagnosis questions, 5 scalp satisfaction and characteristics questions before experiment, 5 scalp satisfaction and characteristics after experiment, and 6 product satisfaction questions.

2.3 Clinical research methodology

In this experiment, the scalp cleaning method using company B's ampoule every day

was reconstructed by referring to the previous study of Kim(2015)[13], and the self-management method was shown in Fig. 1.
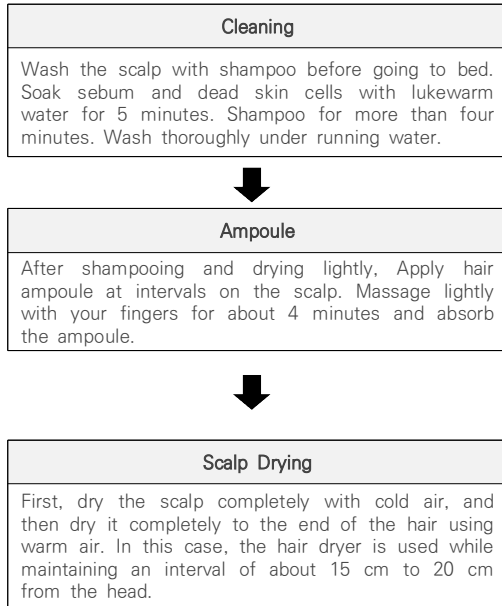
Cleaning
Wash the scalp with shampoo before going to bed. Soak sebum and dead skin cells with lukewarm water for 5 minutes. Shampoo for more than four minutes. Wash thoroughly under running water.

Ampoule
After shampooing and drying lightly, Apply hair ampoule at intervals on the scalp. Massage lightly with your fingers for about 4 minutes and absorb the ampoule.

Scalp Drying
First, dry the scalp completely with cold air, and then dry it completely to the end of the hair using warm air. In this case, the hair dryer is used while maintaining an interval of about 15 cm to 20 cm from the head.

Fig. 1. How to self-manage shampoo of study subjects

2.4 Measuring instruments and methods

For measuring scalp and hair conditions before and after the experiment, Aram Huvis scalp measuring instrument API 202 (Korea) is used, and the detailed measurement method is the same as Fig. 2.
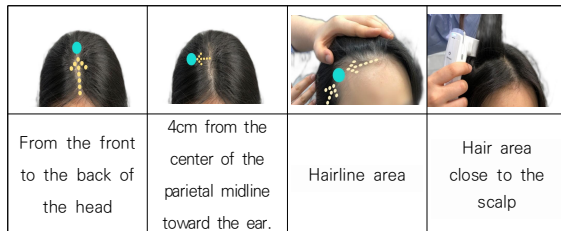
From the front to the back of the head	4cm from the center of the parietal midline toward the ear.	Hairline area	Hair area close to the scalp

Fig. 2. Scalp and hair measurement

3. Research Results

3.1 The lifestyle of the study subjects

The results of the analysis of the daily life habits of the researchers are shown in Table 1.

According to the analysis, 33.3% of the respondents said they slept less than five hours and less than five to 6 hours. In terms of the number of times of drinking, more than 6 times a month accounted for 50%, The amount of smoking was the highest at 50% in half a pack or more than one pack.. 50% of the respondents said their diets very irregular and 33.3% said they were irregular. The highest percentage of people who take contraceptives was no, 66.7% said they had regular periods and 83.3% said they did not exercise. Currently, it is understood that do not diet is 100%, but excessive diet experience in the past is 50%, and no is 50%. Usually, 66.7% of the respondents said normal stress was the highest, followed by 50% of the respondents said normal work stress, 33.3% said yes, and 16.7% said very much.

Table 1. Study subjects' lifestyle

Sortation		%
Sleep time	Less than 5 hours	33.3
	Less than 5 to 6 hours	33.3
	Less than 6 to 7 hours	16.7
	Less than 7 to 8 hours	0
	More than 9 hours	16.7
Drinking alcohol	I don't drink it	0
	Once a month	16.7
	2–3 times a month	0
	4–5 times a month	33.3
	6 times a month	50
Amount of smoking	I don't smoke	16.7
	Less than half a pack	33.3
	Less than one pack	50
	One pack~ Less than two packs	0
	Two or more packs	0
Dietary life	Very irregular	50
	Irregular	33.3
	Normal	16.7
	Regular	0
	Very regular	0
Contraceptive use	Yes	0
	No	100
Menstrual cycle	Regular	66.7
	Irregular	33.3
Exercise	Yes	16.7
	No	83.3
Diet	Yes	0
	No	100

(Continued)
Table 1. Study subjects' lifestyle

Sortation		%
An unreasonable diet experience	Yes	50
	No	50
Stress	There isn't	0
	I don't understand	0
	Normal	66.7
	That's right	33.3
	That's very true	0
Stress on one's work	There isn't	0
	I don't understand	0
	Normal	50
	That's right	33.3
	That's very true	16.7

3.2 study subjects' shampoo habits

The results of the analysis of the scalp cleaning methods of the subjects in this study are shown in Table 2. According to the analysis, 66.7% of shampoo products were normal shampoo and 33.3% were exclusive shampoo for hair loss. The number of times shampoo was used was 83.3% for once a day and 33.3% for side and above for the first wash. When shampooing, 83.3% answered habitual, 66.7 % answered warm, and 100% answered yes. The highest percentage was 66.7% for careful shampooing and 83.3% for hair loss.

Table 2. Study subjects' scalp cleaning methods

Sortation		%
Shampoo product	Shampoo and conditioner combined	0
	Scalp shampoo	0
	Dandruff shampoo	0
	Shampoo exclusively for hair loss	33.3
	Normal shampoo	66.7
	I don't understand	0
Frequency of shampoo use	Once a day	83.3
	More than twice a day	16.7
	Once every two days	0
	Guitar	0
The first part of shampooing	Side	33.3
	Occipital region	16.7
	Forehead	0
	Part	16.7
	Upper part of the head	33.3
Reasons for the first wash area when shampooing	Dandruff	0
	Itchiness	0
	Oiliness	16.7
	Rash	0
	Habitual	83.3

	Very hot	0
Water temperature when shampooing	Hot	33.3
	Cold	0
	Little warm	0
	Lukewarm	66.7
Wash thoroughly when shampooing	Yes	100
	No	0
Meticulously dry shampooing	Yes	33.3
	No	66.7
Hair loss during shampooing	Yes	83.3
	No	16.7

3.3 Self-diagnosis of scalp before experiment

Analysis of the pre-experimental scalp self-diagnosis questionnaire of the subjects of this study was shown in Table 3.
According to the analysis, 50% of the scalp types were oily, 33.3% were dry and 16.7% were normal. The health of the scalp was the highest at 83.3%, but the hair condition was rough, thin and weak, 50% of the scalp problems were damaged hair, 16.7% were itchy, and 16.7% were inflammation and erythema.

Table 3. Self-diagnosis of scalp before experiment by study subjects

Sortation		%
Scalp type	Dry scalp	33.3
	Oily scalp	16.7
	Normal scalp	50
Scalp health condition	Very bad	0
	Bad	16.7
	Normal	83.3
	Good	0
	Very good	0
Hair condition	Thick and healthy	0
	Thin but healthy	0
	Roughness	50
	Thin and weak	50
	It's very thin and brittle	0
Scalp problem	Damaged hair	50
	Itchiness	16.7
	Inflammation, erythema	33.3
	Hair loss	0
	Dandruff	0

3.4 Pre-experimental scalp satisfaction and characteristics

Table 4 shows the results of analyzing the survey on scalp satisfaction and characteristics

of the subjects before the experiment.

As a result of the analysis, one's scalp satisfaction, scalp vitality, and elasticity were the highest at 50% and 66.7%, respectively. As for the degree of fever of the scalp, normal and yes were the highest at 33.3%. After washing, 50% of the scalp was no and 33.3% of the cases were not at all, and 66.7% were normal for the degree of itching of the scalp.

Table 4. Pre-experimental scalp satisfaction and characteristics of researchers

Sortation		%
Scalp satisfaction	Not at all	0
	No	16.7
	Normal	50
	That's right	33.3
	That's very true	0
Degree of scalp vitality and elasticity	Not at all	0
	No	16.7
	Normal	66.7
	That's right	16.6
	That's very true	0
Scalp heat generation	Not at all	0
	No	16.7
	Normal	33.3
	That's right	33.3
	That's very true	16.7
Degree of scalp tightening after cleaning	Not at all	33.3
	No	50
	Normal	16.7
	That's right	0
	That's very true	0
Scalp itching	Not at all	16.7
	No	0
	Normal	66.7
	That's right	16.6
	That's very true	0

3.5 Changes in scalp conditions before and after the experiment

In order to compare and diagnose changes in keratin mass, scalp tone, and pore conditions of the subjects of this study, changes in scalp condition before and after the experiment were compared and analyzed using Aram Huvis API 202. Most of the pre-experiment subjects showed cloudy scalp color, inflammation and erythema, closed pores, but after 4 weeks, most clinical people's oil and sebum decreased, and the accumulated keratin around the pores

became clean and white(Fig. 3).
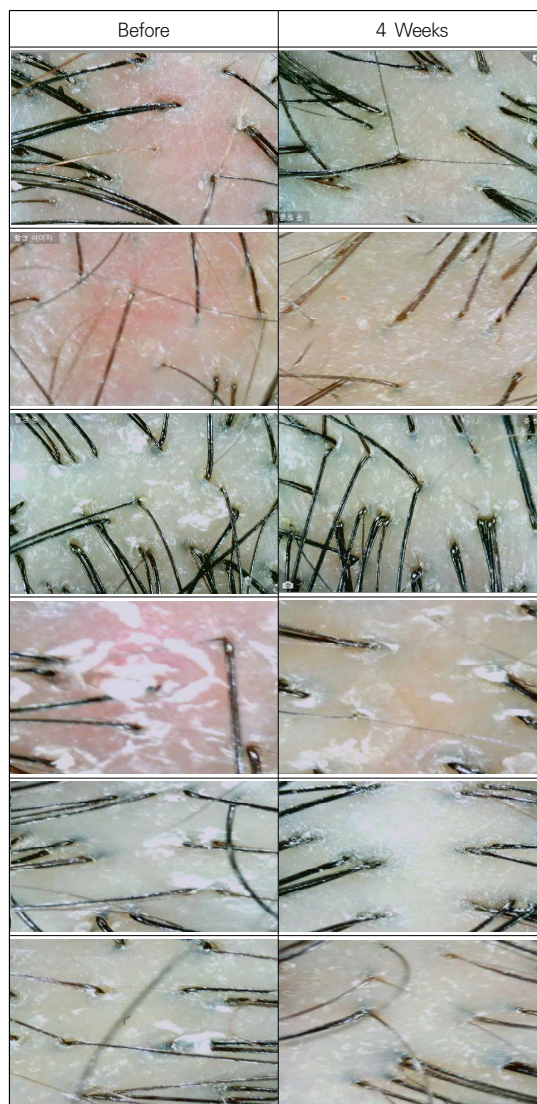
Fig. 3. Changes in scalp conditions before and after the study subjects' experiments

3.6 Changes in hair thickness before and after the experiment

Fig 4 shows the differences in hair thickness between the subjects of this study before and after the experiment. A significant difference was confirmed as a result of this study ($p < 0.01$).
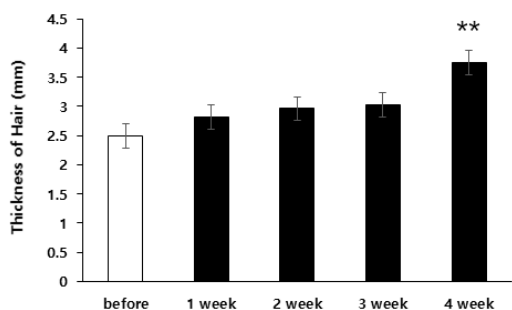
Fig 4. Results of changes in hair thickness of study subjects

3.7 Post-experimental scalp satisfaction and characteristics

Table 6 shows the results of analyzing the survey on scalp satisfaction and characteristics of the subjects of this study after the experiment.

As a result of the analysis, 66.7% of scalp satisfaction was yes and 33.3% of very yes, and 66.7% of the scalp's vitality and elasticity were yes. The degree of improvement in heat generation in the scalp was 50% each of yes and very yes. The degree of improvement in scalp tightening after cleaning was the highest at 66.7%, and the degree of improvement in itching was the highest at 66.7%.

Table 5. Post-experimental scalp satisfaction and characteristics of the study subjects

Sortation		%
Scalp satisfaction	Not at all	0
	No	0
	Normal	0
	That's right	66.7
	That's very true	33.3
Degree of scalp vitality and elasticity	Not at all	0
	No	0
	Normal	16.7
	That's right	66.7
	That's very true	16.7
Scalp heat generation	Not at all	0
	No	0
	Normal	0
	That's right	50
	That's very true	50
Degree of scalp tightening after cleaning	Not at all	0
	No	16.7
	Normal	16.7
	That's right	66.7
	That's very true	0

	Not at all	0
Scalp itching	No	0
	Normal	0
	That's right	33.3
	That's very true	66.7

4. Conclusion

This study was conducted to investigate the effects of using L-Menthol, Salicylicacid, and Dexpanthenol on scalp and hair in six women with problematic scalp in their early 20s living in Gyeonggi-do. The results of this study are summarized as follows.

First of all, most of the researchers showed normal scalp satisfaction before and after the experiment, but the overall response was positive after the experiment.

The second analysis of scalp conditions and hair thickness changes before and after the experiment showed that most of the researchers showed inflammation and erythema due to waste matter such as sebum and keratin before the experiment. In addition, the thickness of the hair increased by 1.262 mm on average after 4 weeks compared to before the experiment, indicating a statistically significant difference ($p < 0.01$).

The results showed positive effects such as reduced inflammation, decreased scalp fever and erythema, decreased itching and hair leakage, clean pore condition, and increased hair thickness when using ampoule B containing L-Menthol, Salicylicacid, and Dexpanthenol. This can be effectively managed without investing much money and time by using hair ampoule containing L-Menthol, Salicylicacid, and Dexpanthenol as a home care method, and it can be considered useful for healthy scalp if it continues to be managed with continuous interest in scalp care.

REFERENCES

[1] H. J. Joo. (2015). *Status of scalp and hair management by age.* Master's thesis. Sungkyul University, Anyang.

[2] H. R. Ryu & N. Y. Kim. (2010). Study on the awareness on scalp·hair care - Focusing on men in 30~40s in Gangnam, Seoul -. *Asian Society of Beauty & Cosmetology, 8(3),* 165-173. UCI : G704-SER000010442.2010.8.3.005

[3] H. S. Im. (2018). The Functional Effects for the Prevention and Treatment on Hair Loss from Astringent Persimmon Fruit Extracts. *The Journal of the Convergence on Culture Technology, 4(3),* 253-259. DOI : 10.17703/JCCT.2018.4.3.253

[4] I. O. Moon & S. S. Cho. (2000). The Association of some Diseases on Scalp Hair Trouble in Korean Female College Students. *The Korean Journal of Health Education*, 3.

[5] G. A. Kim. (2012). *Survey Research on Hair Loss and Hair Transplant Surgery.* Master's thesis. Konkuk University, Seoul.

[6] M. Y. Kim. (2009). *A Study on Public Perception and State of affairs on Scalp & Hair loss care.* Master's thesis. Sookmyung Women's University, Seoul.

[7] J. H. Mo & M. R. Song. (2010). A Study for the Influence of Scalp and Hair Management Types on Alopecia. *Journal of the Korea Soc. Beauty and Art, 11(3),* 111-120. UCI : G704-SER000008940.2010.11.3.002

[8] J. W. Kim, A. H. Jo & J. H. Lee. (2019). Analysis of the patent trends for natural components related to hair loss. *Asia-pacific Journal of Multimedia Services Convergent with Art, Humanities, and Sociology, 9(3),* 375-387. DOI : 10.35873/ajmahs.2019.9.3.036

[9] S. H. Kim & G. L. Lee. (2020). A Study on the Management of Alopecia According to the Time of Awareness of Scalp Seborrheic Dermatitis and Alopecia. *The Korean Society Of Beauty And Art, 21(2),* 211-226. DOI : 10.18693/jksba.2020.21.2.211

[10] M. C. Martínez-Pabón, M. Ortega-Cuadros. (2020). Thymol, menthol and eucalyptol as agents for microbiological control in the oral cavity: A scoping review. *Revista Colombiana de Ciencias Químico-Farmacéuticas, 49(1),* 44-69. DOI : 10.15446/rcciquifa.v49n1.87006

[11] P. Begoun. (2010). *The Original Beauty Bible* (p. 347). Beginning Press.

[12] M. H. Lee. (2015). Effect of hair dyeing and scalp toner containing Stichopus japonicus extract on the hair loss. Master's thesis. Konkuk University, Seoul.

[13] T. Y. Kim. (2015). *Effecting of the scalp care on hair loss by using sea cucumber scalp enhancer with sea cucumber extract.* Master's thesis. Konkuk University, Seoul.

유 선 희(Seon-Hee You)   [정회원]

· 2016년 2월 : 건국대학교 생물공학과(이학박사)
· 2021년 4월 ~ 현재 : 연성대학교 뷰티스타일리스트과 스킨케어전공 조교수
· 관심분야 : 피부미용, 화장품
· E-Mail : yoush4843@naver.com

김 나 연(Na-Yeon Kim)   [정회원]

· 2016년 2월 : 건국대학교 생물공학과(이학박사)
· 2019년 11월 ~ 현재 : 뷰끌레르 대표
· 2021년 2월 ~ 현재 : 용인예술과학대학교 뷰티케어과 겸임교수
· 관심분야 : 헤어미용, 화장품
· E-Mail : nana4120@naver.com