

The Relationship between Types of Hair Coloring with Hair Damages and Scalp Problems in Medical Students of University Sumatera Utara, Indonesia

ORIGINAL

Abstract

Introduction: Hair coloring is used to enhance beauty. It consist of two types, non permanent and permanent. Hair coloring could cause hair damages and scalp problems. The aim of our study is to study the relationship between type of hair coloring and hair damages and/or scalp problems.

Method: It was an analytic study with cross-sectional method. This study was done in Faculty of Medicine in University Sumatera Utara (USU), Indonesia using total sampling technique.

Results: Of 300 students from batch 2011-2013 who performed hair coloring, 231 students (77,0%) experienced hair damages. The type of hair damages mostly found were the combination of split ends and hair loss in 96 students (41.5%). 193 students (64,3%) experienced scalp problems, the commonest being scaly scalp in 87 students (45.1%). Relationship between type of hair coloring with hair damages and scalp problems both were statistically significant ($p=0,0001$).

Conclusion: It was concluded there is a significant relationship between hair coloring with hair damages and scalp problems.

Introduction

In society today, especially in teenagers, hair coloring is one of the important aspect of beauty enhancement other than straightening (rebonding), curling and others. [1] One of the essential ingredients in hair coloring is hydrogen peroxide (H_2O_2), which gives color to the hair. The composition is different between the types of hair coloring. The content of hydrogen peroxide in the hair coloring can cause damage to the hair. [2]

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Keywords

Hair Coloring; Hair Damages;
Scalp Problems.

There are two types of hair coloring, non permanent and permanent. Non permanent hair coloring lasts for less than 6 weeks. An example is temporary hair coloring (temporary) and semi-permanent hair coloring. Non-permanent hair coloring is often used for special occasions, events, parties and Halloween. [3] Permanent hair coloring lasts for more than 6 weeks. Permanent hair coloring contains a developer, or oxidizing agent, and the alkaline ammonia agent. When a color that contain alkaline materials is combined with the developer (usually hydrogen peroxide). [4] Peroxide becomes alkaline and diffuses through the hair fiber, enters the cortex, where the melanin is located. Coloring occurs when the peroxide breaks down the melanin and replace it with a new color. Ammonia opens the hair cuticle so that the color pigment can penetrate deep into the hair shaft. Permanent hair color cannot be washed away, but it may fade. [5]

In the study conducted by Al-Ghamdi in Saudi Arabia (2011) [6], the type of hair coloring commonly used was permanent hair coloring; without performing an allergy test before coloring. Hair coloring can cause side effects due to changes in the structure of the hair; causing it to be dull, dry, brittle, suffer split ends, and eventually hair loss. Similarly, on the scalp, hair coloring can cause damage resulting in scaly scalp, dry, itchy, and so on. [7]

Method

This was an analytical study with cross-sectional sample of 300 female students at the Faculty of Medicine in USU, Indonesia who performed hair coloring. This study was conducted using total sampling. Respondents qualified the criteria of inclusions such as performance of hair coloring less than 6 months and acceptance of informed consent and criteria of exclusions such as who did straightening and or curling within 6 months, who suffered from high fever in 6 months, and who suffering from chronic diseases such as cancer, diabetes and systemic

lupus erythematosus. Each respondent filled out a questionnaire containing 16 questions relating to the type of hair coloring, hair damages and scalp problems due to hair coloring. Analysis of the research employed the chi-square test. [8] Statistical significance was set of a prior at $p < 0.05$.

Results

Table 1 shows about the relationship between types of hair coloring with hair damages. **Table 2** shows about the relationship between types of hair coloring with scalp problems. Statistical analysis shows a significant relationship between type of hair coloring with hair damages ($p=0.0001$) and scalp problems ($p=0.0001$). **Table 3** shows about the types of hair damages among students who perform hair coloring with majority of split ends and hair loss (41.5%). **Table 4** shows about the types of scalp problems with majority of scaly scalp (45.1%) among the students.

Table 1. Relationship between Type of Hair Coloring with Hair damages.

Type of Hair Coloring	Hair damages				Total	
	Negative		Positive			
	n	%	N	%	n	%
Non permanent	55	18.3	100	33.3	155	51.7
Permanent	14	4.7	131	43.7	145	48.3
Total	69	23.0	231	77.0	300	100.0

df: 1, $p=0,0001$.

Table 2. Relationship between Type of Hair Coloring with Scalp problems.

Type of Hair Coloring	Scalp problems				Total	
	Negative		Positive			
	n	%	N	%	n	%
Non permanent	83	27.7	72	24.0	155	51.7
Permanent	24	8.0	121	40.3	145	48.3
Total	107	35.7	193	64.3	300	100.0

df: 1, $p=0,0001$.

Table 3. Type of Hair damages.

No	Type of Hair damages	Total	Percentage (%)
1	Dull hair	2	0.9
2	Dull hair and dry hair	6	2.6
3	Dull hair and split ends	16	6.9
4	Dry hair and split ends	44	19.0
5	Brittle hair	2	0.9
6	Brittle hair and split ends	36	15.6
7	Split ends	8	3.5
8	Split ends and hair loss	96	41.5
9	Hair loss	21	9.1
	Total	231	100.0

Table 4. Type of Scalp problems.

No	Type of Scalp problems	Total	Percentage (%)
1	Itchiness	10	5.2
2	Itching and burning and scaly scalp	17	8.8
3	Itching and scaly scalp	50	25.9
4	Itching and scaly scalp and reddish	10	5.2
5	Itching and scaly scalp and swelling	2	1.0
6	Itching and scaly scalp and injuries	1	0.5
7	Scaly scalp	87	45.1
8	Scaly scalp and reddish	11	5.7
9	Scaly scalp and redness and swelling	3	1.6
10	Scaly scalp and injuries	2	1.0
	Total	193	100.0

Discussion

This study conducted at the Faculty of Medicine in USU, Indonesia which found 300 respondents had performed hair coloring from batch 2011 to 2013. Hair plays an important role in human life as the crown of pride of women and men. [9] Other than hair coloring, hair styling such as hair straightening,

curling and so on also have been performed by youngsters to modify their appearance. [10] In the previous study conducted by Aainaa & Jusuf (2013), there was a significant relationship between hair straightening and curling with hair damage. [11]

In this study, total of 155 respondents (51.7%) did non permanent hair coloring and 145 respondents (48.3%) did permanent hair coloring. The permanent hair coloring composed in alkaline solutions in order to facilitate the penetration of chemicals pass through the cuticle. [12]

Table 1 shows that 100 respondents who did non permanent hair coloring and 131 respondents who did permanent hair coloring had experienced hair damages. From the results of statistical analysis with chi-square test, the $p = 0.0001$ showed there is a significant relationship ($p < 0.05$) between the type of hair coloring with hair damages. It shows the type of hair coloring can cause side effects, because the substance used in hair coloring damages the cuticle layer that protects the hair. [13]

In **table 2**, we found 72 respondents who did non permanent hair coloring and 121 respondents who did permanent hair coloring experienced scalp problems. From the results of statistical analysis with chi-square test, the $p = 0.0001$ showed there is a significant relationship ($p < 0.05$) between the type of hair coloring with scalp problems. It shows the type of hair coloring can cause side effects, because the substance used in hair coloring can cause problems such as allergic reactions and irritations on the scalp. [14]

In **table 3**, 231 respondents (77.0%) experienced hair damages. In this study, types of hair damages mostly suffered by the respondents are the combinations of split ends and hair loss in 96 respondents (41.5%). Chemicals such as ammonia, hydrogen peroxide, aniline contained in the hair coloring process can cause damage to the hair as the hair dull, dry hair, hair loss, split ends and brittle hair. [15]

In **table 4**, we found 193 respondents (64.3%) experienced scalp problems from 300 respondents. In

this study, types of scalp problems mostly suffered by respondents are scaly scalp in 87 respondents (45.1%). Some cosmetics contain mild irritants that caused the reaction occurs after repeated use or long-term. [16]

Conclusions and Suggestions

The number of students who performed hair coloring and experienced hair damages were 77.0% and scalp problems were 64.3%. Types of hair damages due to hair coloring were the combinations of split ends and hair loss in 41.5%. Types of scalp problems due to hair coloring were scaly scalp in 45.1%. There is a significant relationship between hair coloring with hair damages and scalp problems. However, further research needs to be done regarding to the relationship. The health worker should explained about the side effects due to hair coloring such as hair damages and scalp problems in order to further increase the insight and knowledge of the community. They also must consult with a dermatologist before perform hair coloring. Manufacturers of hairstyling products should provide warning signs to customers about the side effects that might result from the activity of hair coloring on the product package.

Disclosure

In this study, there is no conflict of interest.

References

1. Bolduc C, Shapiro J, 2001. *Hair Care Products: Waving, Straightening, Conditioning, and Coloring*. Clinics in Dermatology, Elsevier Science Inc. 431-6.
2. Kusumadewi, dkk., 2001. *Pengetahuan dan Seni Tata Rambut Modern*. Jakarta: Meutia Cipta Sarana & DPP. Tiara Kusuma, 19-36
3. Bariqina E, Ideawati Z, 2001. *Perawatan & Penataan Rambut*. Percetakan Mitra Gama Widya.83-94.
4. Carbett JF, 1988. *Hair coloring*. Clinis in Dermatology, Department of Research and Development, Clairol, Inc., Stamford, Connecticut. 93-101.
5. Brown RG, Burns T, 2005. *Dermatology Eighth Edition*. Jakarta: Erlangga, 133-41.
6. AlGhamdi KM, Moussa NA, 2011. *Knowledge and practices of, and attitudes towards, the use of hair dyes among females visiting a teaching hospital in Riyadh, Saudi Arabia*. Available from: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3221134/> [Accessed from November-December 2011].
7. Iqbal M, 2012. *Hubungan Pelurusan Rambut (Rebonding) dengan Kejadian Rambut Rontok*. Available from: <http://repository.usu.ac.id/handle/123456789/31211>. [Accessed on 7 December 2012].
8. Wahyuni AS, 2008. *Statistika Kedokteran*. Bamboedoea Communication, Jakarta. 91.
9. Wolff K, Goldsmith LA, Katz SI, Gilchrest BA, Paller AS, Leffell DJ, 2012. Disorders Presenting in Skin and Mucous Membranes. In: *Fitzpatrick's Wolff, K., Goldsmith, L.A., Katz, S.I., Gilchrest, B.A., Paller, A.S, Leffell, D.J., ed. Dermatology In General Medicine*, Volume two 8th Edition, McGraw-Hill, New York, 182-6.
10. Jusuf NK, 2014. *Pengikalan dan Pelurusan Rambut In: Everything About Hair*. Badan Penerbit Fakultas Kedokteran Universitas Indonesia, 161-70.
11. Aainaa N, Jusuf NK, 2013. *Hubungan Pelurusan Rambut atau Pengeritingan Rambut dengan Kerusakan Rambut pada Mahasiswi Fakultas Kedokteran Universitas Sumatera Utara Angkatan 2009-2011*. Karya Tulis Ilmiah Fakultas Kedokteran Universitas Sumatera Utara, Medan Indonesia.
12. Rahmadewi, 2014. *Kosmetik yang Menginduksi Kerusakan Rambut In: Everything About Hair*. Badan Penerbit Fakultas Kedokteran Universitas Indonesia, 171-9.
13. Harrison S, Sinclair R, 2003. *Hair coloring, permanent styling and hair structure*. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/17163926> [Accessed on 2 July 2003].
14. Krismi A, Sudibyo ES, Indrastuti N, 2008. *Dermatitis Kontak Alergi Cat Rambut*. Bagian/SMF Ilmu Kesehatan Kulit dan Kelamin, FK Universitas Gadjah Mada/ RS dr. Sardjito Yogyakarta. 124-8.
15. Jaffer S, Qureshi A, 2004. *Dermatology Quick Glance*. Mc Graw-Hill, United States, 150.
16. Tantari SHW, 2014. *Efek Samping Kosmetik Rambut In: Everything About Hair*. Badan Penerbit Fakultas Kedokteran Universitas Indonesia, 188-95.

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