

Cosmetic hair colorants - to beautify or to destroy!

Vinma H Shetty, Farzana Nazmuddin, Ashish Shetty

Department of Dermatology, A J Institute of Medical Sciences, Kuntikana, Mangalore, Karnataka, India

Abstract

Objective To determine the adverse effects of hair colorants on hair and skin and to find an association between types/usage of hair colorants and their adverse effects.

Methods This cross-sectional, questionnaire-based study was done on female medical students and faculty only. A questionnaire was given to a sample of 150, which matched our criteria. SPSS software 17 was used for data analysis.

Results Mean age of the subjects was 25.41 ± 3.13 years. Incidence of adverse effects among frequent users of hair dyes was 48.8%. Incidence of adverse effects among occasional users of hair dyes was 38.5%. Diffuse non-scarring alopecia (34%) was the most common adverse effect on hair. A higher percentage of adverse effects were observed in subjects who used permanent organic hair dyes.

Conclusion There is a significant positive association between hair dye use and various adverse consequences in the hair and skin. Furthermore, permanent hair dyes cause more damage than other vegetable or temporary dyes.

Key words

Adverse effects, frequent users, permanent hair dyes.

Introduction

Hair is a symbol of beauty. Hair care, color, and style play an important role in people's physical appearance and self-perception.¹ Today the hair-care industry has a plethora of products that influence many individuals to use these products so as to accentuate one's own beauty. As a result of which, some beautify, some nourish, while some damage extensively. Hair dyes make up a very significant section of hair cosmetics. Among these, permanent hair colors are the most commonly used, because of their longevity, ease of use and ability to have a range of color shades.²

Methods

The sample taken for this study was from the students and faculty of the medical college. Only females were included in the study. Men, pregnant women, lactating mothers, samples with prior history of scalp disease, hair loss and damaged hair were excluded. A cross-sectional questionnaire was prepared to gather (a) demographic data (b) reason for using hair colorants (c) frequency of application of hair colors in a year (d) type of hair coloring materials used (e) adverse effects of hair colorants on hair and skin (**Appendix 1**). This questionnaire was given to a sample of 150, which matched our criteria. Study was conducted over a 12 months period (January 2014-January 2015). Written informed consent was taken from all the participants. The study was approved by the institutional ethical

Address for correspondence

Dr. Vinma H Shetty, Associate Professor
A J Institute of Medical Sciences
Kuntikana, Mangalore, Karnataka, India 575004
Email: vinma_shetty@yahoo.co.in

committee. SPSS software 17 was used for data analysis.

Results

The demographic data showed that more number of samples used hair dyes occasionally. Adverse effects were observed increasingly among the frequent users as compared to the occasional users. A higher incidence of adverse effects was observed in the subjects who were using hair bleaches along with hair dyes, in comparison to those who used hair dyes alone (**Table 1**).

Table 2 shows beautification as the significant reason behind hair coloring, followed by social acceptability.

In our sample, the most common adverse effect on hair was found to be diffuse nonscarring alopecia (34 %) [**Figure 1**], followed by frizzy hair (30%) [**Figure 2**] and thinning and weakening of hair (27.3 %) [**Figure 4**]. Pruritus was a common complaint on the scalp. 4.7% of patients showed signs of allergic contact dermatitis and these patients showed positive patch test for paraphenylenediamine (**Table 3**).

An association of adverse effects with respect to type and frequency of hair dye usage was observed (**Table 4**). This observation suggested that frequent users had a higher incidence of adverse effects and also those who used permanent organic dyes. Among the seven patients who developed allergic contact dermatitis, two of them continued to use hair dyes with the concern of social acceptability.

Discussion

The appearance of hair is determined by the way the hair surface and hair body reflect incident

Table 1 Demographic data

Age (years, mean \pm SD)	25.41 \pm 3.13
Frequency of application of hair colors in a year (mean \pm SD)	3.16 \pm 2.45
Overall incidence of adverse effects among frequent users of hair dyes (n=41)	20(48.8%)
Overall incidence of adverse effects among Occasional users of hair dyes (n=109)	42 (38.5%)
Overall incidence of adverse effects among those who used hair bleaches prior to the permanent hair dyes (n=24)	15 (62.5%)

Table 2 Reason among the sample for using cosmetic hair colorant (n=150).

Reason for using cosmetic hair color	N (%)
Beautification	65 (43.3)
Social acceptability	41 (27.3)
Effect of advertisement and social media	20 (13.3)
Peer pressure	18 (12)
Ease of management	6 (4)

Table 3 Adverse effects of cosmetic hair colors on hair and skin among sample

Adverse effect	N (%)*
Hair loss	51 (34)
Frizzy hair	45 (30)
Thinning and weakening of hair	41 (27.3)
Split ends	20 (13.3)
Dandruff	38 (25.3)
Pruritus	32 (21.3)
Allergic contact dermatitis	7 (4.7)

*Some subjects had more than one adverse effects

light.³ Consumers subjectively take hair shine as a sign of health and beauty.

Despite increased price structure, demand particularly for hair care products have shifted away from conventional products towards value added products. This highlights the fact that consumer are willing to pay higher price for quality and additional benefits.⁴ We in our study observed that even though subjects were aware of the adverse effects, the need for beautification outweighed the consequences.

Table 4 Association of adverse effects with types and usage of cosmetic hair colorants

Parameter	Frequent users (n=41)		Occasional users (n=109)	
	Total no of samples (n = 41)	Samples who experienced adverse effects N (%)	Total no of samples (n = 109)	Samples who experienced adverse effects N (%)
Permanent organic dyes (n=43)	5	4 (80%)	56	34 (60.7%)
Semi-permanent and temporary organic dyes (n=57)	20	13(65%)	14	6 (42.8%)
Metallic dyes (n=15)	Nil	Nil	Nil	Nil
Vegetable dyes (n=35)	16	3 (18.7%)	39	2 (10.5%)

Chemical dyeing contributes to large amount of chemical and mechanical damage to the hair more susceptible to breakage after time, which is undesirable for healthy hair. In high concentration surfactant may cause irritation, drying to skin, inflammation and allergic reactions. High surfactant concentration in microemulsions can also cause cuticle damage and hair loss.⁴

In our study we observed a definite higher incidence of hair loss following dye usage. We also observed a significant association between frequency of dye usage and extent and quantity of hair loss. Hence frequency of usage played a major etiological role in the overall adverse consequence of dyes.

Permanent hair dyes differ from temporary and semipermanent dyes in several ways. Permanent is not removable by shampooing, whereas temporary dyes are easily washed out in one shampoo rinse. Semipermanent dyes are removed in 4 to 12 shampoos.⁸ Oxidative hair dyes are widely used to provide permanent color to hair (generally lasting from four to six weeks).^{5,6} Hydrogen peroxide is used for bleaching or decoloring of the human hair.⁷ The

hair shaft damage is accentuated with the use of dark colored dyes (black, dark brown) because darker shades need higher concentrations of precursors.⁹

Subjects were counselled regarding (a) reduction in frequency of dye application (b) stop bleach usage prior to the dye application (c) cease usage of dye completely if significant adverse consequences were witnessed (d) use of bland moisturizers to the scalp skin 2 to 3 days prior to application of hair dye in order to reduce the likely contact of dye with scalp skin.

Conclusion

The desire to beautify and style oneself and the influence of social media have led many towards the extensive use of hair dyes. These hair colorants behave notoriously causing multiple adverse effects. It is important to create awareness among young individuals regarding the adverse consequences so as to prevent further damage. A further study may be required in this direction for assessing the other allergens that may be responsible for the damage due to hair dye application.

Appendix 1 Questionnaire

Name _____ Age _____ Occupation _____ Marital status _____

1. How frequently do you apply hair dye? a) Once a month b) Once in 3-6 months c) 6 months to 1 year d) More than a year	5. use of other hair products? a) Hair conditioners b) Hair sprays c) Hair bleach d) Hair shampoo
2. Which dye do you use? a) Temporary colour dye b) Permanent colour dye c) Mehendi d) All of the above	6. Where do you apply hair dye? a) At the beauty parlour b) At home c) Both
3. Reason for hair dye application? a) Beautification b) Social acceptability c) Effect of advertisement and social media d) Peer pressure	7. Hair loss? a) Absent b) Less than 100 hair per day c) More than 100 hair per day
4. Side effects caused due to hair dye application? a) Hair loss b) Frizzy hair c) Pruritus and dandruff d) Thinning and weakening of hair e) Split ends	8. Have the side effects made you a) Stop the hair dye application b) Reduce the hair dye application Or do you still continue with the same frequency as earlier

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