

Knowledge, practice and adverse reactions amongst Hair dye users - A cross sectional study

Research Article

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Abstract

Introduction: Colour of hair is most conspicuous phenotype of human beings and plays an important role in one's overall physical beauty. Premature hair greying (PHG) has caused the increased use of various hair dyes in population though it has adverse effects. **Aim-** To assess knowledge, practice of hair dye users with purpose, frequency of use and adverse reactions if any on hair, scalp, skin. **Methodology:** A cross-sectional study was conducted on participants from PCMC region by interview method using a questionnaire (20 questions) specially prepared pertaining to use of hair dye and adverse reactions to it. **Statistical Analysis-**The demographic data is expressed as mean \pm standard deviation, quantitative data expressed as percentages. **Results:** A total 98 subjects including 75.5% and 24.5% females and males respectively. The participants started using hair dye at an age of 25 (± 3.03) years. Herbal and Synthetic dyes were used by 36.74% and 63.27% respectively. Frequency of use in a year was 4-5 times in 58.16%. Adverse reactions of dye on body of hair like dryness 46.94%, loss of hair 30.62%, change in texture and thinning were reported. 29.59% of subjects showed ill effects during dyeing of scalp while in 68.36% of subjects after the dyeing process was complete. **Conclusion:** Majority Population started hair dyeing at very early age using Chemical dyes even though they perceived herbal dyes were safe. They continued hair colouring despite adverse reactions, which indicates aesthetic importance of hair colour and need of research in the field of *Ayurveda* for developing safe, natural hair dye.

Key Words: Herbal hair dye, chemical hair dye, adverse effects of hair dye, hair care, PHG, Ayurveda.

Introduction

The beauty of skin and hair basically depends on individual's health, diet, habits, job routine, climatic conditions etc. Skin and hair disorders are the common ailments of all age groups. Colour of hair is most conspicuous phenotype of human beings of all. Nowadays people are very much conscious about their look. Greying of hair is natural process of human aging. Grey /white hair develops naturally or prematurely in the process of human aging as a result of progressive and eventual total loss of melanocytes in the hair follicle. Hair with no melanin pigments in cortex is completely white and with few pigments provides grey colour. Due to ever increasing problem of premature greying (PHG) the hair dyes are used periodically for beautiful and younger look. Despite that use of hair dye leads to variety of side effects, there has been increased number of hair dye users in PCMC

region. Hence this study was aimed at finding knowledge, purpose and adverse effects of hair dye among population.

Herbal dyes e.g. *madayantika* leaves, *bhringraj* etc are semi permanent dyes, used traditionally and believed to be safe and nontoxic. Plants have been used traditionally for their hair colouring, growth promoting and anti-aging properties. It has been found in the local market survey that the most of the marketed herbal formulations in India, though claim to be natural, safe and effective may actually contain the harmful synthetic agent, paraphenylenediamine (PPD), at 20-25% concentrations; which is the main ingredient of commercial synthetic dyes. (1) PPD, a key ingredient of many synthetic hair dyes is known to trigger allergic skin rashes in many people. It also causes dermatitis around lips, reddening and swelling of scalp and face etc. (2).

Ayurved treatises which described beautification of the hair as *keshha prasadhana* is a part of daily regimen. (3) Ayurveda defines *keshya* property i.e. beneficial for hair in terms of *Vardhana* (promotion of hair growth) and *Ranjana* (dyeing of hair). *Kesaranjan* action of drugs is also important to maintain aesthetic value of hair in *keshavikar*, *Palitya* (premature greying) which is very common nowadays. (4) It is described in an *Ayurvedic* text that ideal hair should be soft, unctuous, having strong roots and should be black (5). To propagate the main motive of *Ayurveda* towards healthy, beautiful hair and to overcome

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the problem of palitya /PHG /Canities; it is very much essential to conduct research in this direction. As a first step in this direction the present survey study was conducted to assess the knowledge, practice, and adverse reactions among hair dye users.

Aim

To assess the knowledge, practice and adverse reactions among hair dye users in PCMC region.

Objectives

To find incidence of use of hair dye with purpose, frequency of use and to observe any adverse effects on hair, scalp, skin and eyes.

Materials and methods

This cross sectional survey was conducted on staff, students and their relatives from Pimpri, Pune region; with a specially prepared and authenticated questionnaire composed of 20 questions. The protocol was approved by the Institutional Ethics Committee. It was conducted over a period of 3 months from July to September 2018. Subjects from either sex with the age between 20 to 60 years and those who were willing to give the information were screened. Total 163 subjects with grey hair were surveyed and the response of 98 dye users who completed the protocol was used for data analysis. Percentage method was adopted for statistical analysis of quantitative data.

The questionnaire included basic information regarding gender, age, educational status, occupation, the age at which they first started using hair dyes, knowledge of hair colouring products and use of particular type of hair dye, frequency of its use, their purpose of colouring their hair, clinical findings of grey hair and hair dyeing-related adverse effects. Some question items were designed so that the survey subjects could make multiple choices.

Results

A total of 98(60.13%) out of 163; volunteers responded to the questionnaire. There were 75.5% females and 24.5 % males representing the population (Table 1).

Table 1: Demographic data

Variables	Frequency (%) (n=98)
Gender	
Females	75.5
Males	24.5
Mean age years (SD)	28.04 ± 4.01
Marital status	
Single	39.8
Married	60.2
Educational status	
Literate	100
Graduates	18.37
Post graduates	81.63
Occupation	
Employed	64.29
Unemployed/ Student	35.71

SD – Standard deviation

All the volunteers were literate rather highly educated; with 64.29% employed and 35.71% unemployed / students. Observation about marital status (59 married, 39unmarried) was noted. The knowledge regarding the types (natural, synthetic, permanent etc.) and safe/preference use of hair dyes was noted. (Table 2)

Table 2: Knowledge about various types of hair dyes and personal use by participants

Knowledge of Hair Dye-safe/ unsafe	Knowledge of hair dye Frequency %	Use of hair dye Frequency %
Hair colouring was unsafe	90.82	100
Believed that dyeing could cause cancer	54.08	54.08
Natural/ Herbal dyes were safe	80.61	36.74
Synthetic dyes were safe	37.76	63.27
Semi permanent dyes were safe	45.92	51.02
Temporary dyes were safe	38.76	
Permanent dyes were safe	12.25	12.25

90.82% perceived that hair dyeing itself was unsafe yet only 36.74 % used herbal dye whereas 63.27% used synthetic dye.

Practice regarding use of hair dye- The mean age at which the participants started using hair dyes was around 28.04 ± 4.01 years among population. 76.53% used hair dye to look younger, as compared to cosmetic purpose (56.12%) who felt it was fashionable. (Table3).

Table 3: Purpose of Dyeing hair

Purpose	Frequency%
1.For Fashion	56.12
2.Graying of hair	21.43
3.Younger look	76.53
4.Not specified	2.04

Area coverage by the dye was noted to be global and partial in 55 and 21 participants respectively. Maximum number i.e.57 participants (58.16%) used hair dye at a frequency more than 4-5 times a year whereas 23 were habituated for dyeing before one month. Remaining used to do it at an interval of 7 -15 days. (Table 4).

Table 4: Frequency of dyeing hair and area covered by hair dye

Frequency of dyeing hair after	Count of participants (n=98)
1) 7 days	3
2) 15 days	15
3) 1 month	23
4) More than 1 month	57
Area covered by hair dye	
1-Global	55
2-Partial	21
3- Root touch-up	18
1 & 2	4

Only 23.47% preferred to dye their hair at external source as compared with 74.43% did it at home. Majority (80%) of the participants followed the instructions like patch test of hair colouring while only 10% never performed a skin test prior to the usage.

Attitude regarding use of hair dyes- Among the participants, 75% felt the need for repeated dyeing because of cosmetic value and gray hair. Almost 81% of the volunteers were satisfied with the colour after dyeing.

Adverse reactions of hair dyes on skin and hair - No immediate or severe adverse reaction was found in any of the participants but itching, burning, dryness and discoloration of scalp skin was noted after 24 hours in 23 participants. (Table 5)

Table 5: Adverse effects during dyeing at scalp, upon surrounding skin and eyes

Adverse effects	During dyeing at scalp Frequency%	Upon surrounding skin Frequency%	Upon eyes Frequency%
1-Itching	17.35	2.04	2.04
2-Burning	12.25	2.04	12.25
3-Redness	8.16	7.14	11.23
4-Rash	2.04	4.08	-
5-NO	76.53	89	74.50

Adverse reactions of hair dyes on hair - This was an important and for the first time noted observation in similar type of studies. A total of 67 volunteers had reported adverse reactions on body of hair. Dryness of hair was most noticed effect in 46.94%. Hair loss, thinning and dandruff (30.62%, 22.45% & 17.35 % respectively) were very common in participants who used synthetic dyes. Changes in hair texture and discoloration were the major and long lasting ill effects as per (Table 6).

Table 6: Adverse effects after dyeing on hair

Sr.No.	Adverse Effect on hair	Frequency %
1	Discolouration	15.31
2	Dryness	46.94
3	Hair loss	30.62
4	Dandruff	17.35
5	Thinning	22.45
6	Splitting	9.19
7	Changed texture	14.29
8	No side effect	31.63

Survey subjects were allowed to make multiple choices.

Adverse reactions of hair dyes on body-Rhinitis and headache were commonly noticed side effects on the body.82% participants did not suffered from any symptom may be suitable type of dye and time of application are the reasons for it. (Table 7)

Table 7: Adverse effects on general body after dyeing hair

General Side effect	Frequency %
1-Head ache	9.18
2- Fever	-
3-Rhinitis	10.20
4-Other	1.02
5-No effect	82.65

Discussion

In present cross sectional study there were maximum female (75.5%) participants who were married and employed. This finding again supports the need to look young and smart at work field. Total 98 subjects with mean age of 28.04 ± 4.01 years were habitual hair dye users irrespective of gender. It is supportive to similar type of study where the mean age at which both genders started hair dyeing was 27 years, while it was 16 years in a study conducted on Danish adult population and 40-49 years in Korean population. (6,7,8) The youngest volunteer using hair dye in our study was 20 years. However, in a study done in Riyadh, the practice began at an age as young as 15 years.(9)

Purpose to colour hair for youthful appearance was noted in 76.53% of population. The desire to look younger is widespread which is being reinforced everyday by the media and the social media. This is supported by survey response study done by Mrinal G. at Jammu and Kashmir, India (6). Only fashion or cosmetic purpose was observed in 56.12% population where as 21.43% genuinely felt need of dyeing hair due to greying. It is directly suggestive of aesthetic value of hair colour irrespective of age.

Maximum numbers of subjects (n=57) were colouring hair with a gap of more than one month. While the pattern or area covered during dyeing was global in 55 participants. This pattern is suggestive of colouring hair after a longer period. A few dyed hair at an interval of 7-15 days where need was root touch up.

Though in our survey 90.82% perceived that hair dyeing itself was unsafe and hair dyeing products can cause various adverse effects, including allergic contact dermatitis, hair colouring was done by them(10). Also 80.61% population knew Natural / Herbal dyes are safe, only 36.74 % used herbal dye whereas 63.27% used synthetic dye. This can be due to user friendly application and long lasting effect of synthetic dyes. To cater the need of increased demand of the market for natural, safe, efficient and long lasting hair dye; *Ayurveda* science can provide the best solution.

The need for repeated dyeing (75%) because of cosmetic value and gray hair with observed level of satisfaction (81%) after dyeing hair was similar to previous study (11).

Adverse effects during dyeing at scalp as itching and burning only up to 17.35% & 12.25 % respectively. No Side effects during dyeing at skin in 89 % population with minor redness in few subjects. This may be attributed to awareness and conscious selection of suitable and tested hair dye by that individual. No harmful effects were noticed on Eyes other than redness and burning upto 12 % participants. Rhinitis and Headache were the two generalised physical symptoms in dye users (up to 10 %). Despite such experiences all 98 participants continued hair dyeing.

A side effect of dye on body of hair like dryness, hair fall, and change of texture was the important finding of this study. This finding indicates

the need of future study with respect to composition of hair and type of hair dye. It is also required to create awareness in children and younger generation to avoid undue, excess use of hair dye.

Conclusion

Overall 60% of the population was found as regular dye users in PCMC region. Majority population started hair dyeing at very early age using Chemical dyes even though they perceived herbal dyes were safe. They continued hair colouring despite adverse reactions, due to increasing life-achievements, the desire to look youthful. This precipitates aesthetic and remedial importance of hair colour and need of research in developing safe, natural hair dye for this ever increasing condition of PHG.

Global scenario is now shifting towards the use of safer, nontoxic natural product with traditional use, attempts are required to develop herbal hair dye devoid of any chemical, containing few traditionally used herbs and modifiers. It is seen that powder hair dyes with herbal ingredients are prominently in use in south east Asia and it is getting acceptance in other developed markets like EU and Americas (12).

As a holistic science, *Ayurveda* can provide the effective solution to this question without adverse effects and also preventing the recurrence.

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