

Original Article

Chemical hair relaxation and adverse outcomes among Negroid women in South West Nigeria

Olayinka A Olasode

Department of Dermatology & Venereology College of Health Sciences, Obafemi Awolowo University Ile Ife, Osun State, Nigeria

Abstract *Background* The use of chemical hair relaxers has found widespread use in African Negroid women because of the desire to straighten their curly hair. The hair texture in Negroids is essentially coily and the process of straightening makes easier to comb and style. This beautification process, however, is not without its own hazards to the users. We document the adverse outcomes of this practice in a group of Nigerian Negroid women who had been exposed to repeated regular professional application of chemical hair relaxers for a period of greater than one year.

Patients and methods Women who were exposed to regular professional use of chemical hair relaxers for greater than one year were selected from hairdressing saloons with trained hairdressers in the city of study. Self-administered questionnaire was developed to elicit socio-demographic data, motivation for this practice, duration of exposure and various self-reported side effects experienced. Exclusion criteria for respondents included history of hair loss prior to initiating the chemicals, history of use of hair dyes, and history of previous scalp disease.

Results Two hundred and fifty women were subjected to the questionnaire over a period of three months. Their ages ranged between 11-60years with a peak between 21-40years. Sixty two percent of the women were married. The duration of first exposure was 1-20years with repeated application every two to three months. Reasons for the use of chemical hair relaxers included beauty, social acceptability and ease of management of the relaxed hair. Major side effects were documented despite professional handling and these included itchy scalp, dandruff, burnt/scarred scalp, thinning and weakening of hair shaft, hair discolouration, hair loss, and allergic reactions to the chemicals.

Conclusion The practice of hair straightening with chemical hair relaxers is still relevant and still has widespread use among Nigerian Negroid women for beauty and convenient hair management. The various self-reported side effects have health implications and might call for a greater emphasis on safer modes of application and stiffer market legislation concerning these chemicals.

Key words

Chemical hair relaxers, Nigerian Negroid women, adverse outcomes

Introduction

The attempt at beautification especially in

women involves both the skin and its appendages. Scalp hair dressing in women is of major social and sexual display and importance. The African woman prides herself in her hairstyles ranging from tying with thread, weaving of hair strands and later hair straightening initially by the use of hot combs (**Figure 1**). Heating and coiling hot combs were promptly replaced by the use of chemical hair

Address for correspondence

Dr. Olayinka A Olasode
Department of Dermatology & Venereology
College of Health Sciences,
Obafemi Awolowo University Ile Ife, Osun State,
Nigeria
olayinkaolasode@yahoo.com

relaxers that allow for permanent hair straightening. The need for repeated applications of these relaxers has resulted in short and long term impacts on the texture and quality of the hair in users.

Patients and methods

The study centers used were hairdressing saloons for a period of three months. Identified hair saloons randomly selected were included in the study. Selection criteria of saloons included the inclusion only of those hairdressing saloons operated by hairdressers that had undergone minimum of two years apprenticeship training. This was done to eliminate the effect of unprofessional hair handling. Information was obtained using self-administered pre-tested questionnaires on women patronizing these saloons and who had regularly applied chemical hair straighteners for a period \geq one year. The questionnaires were designed to elicit socio-demographic data, motivation for this practice, duration of exposure and various side effects that has been experienced. Exclusion criteria for respondents included history of hair loss prior to initiating the chemicals, history of use of hair dyes and previous scalp disease.

Hairdressers were interviewed and observed in the processing and application of the hair straighteners. Label inserts were examined and noted for contents of the commonly used hair straighteners. Instruction leaflets were studied and noted.

Results

Sociodemographic data

Two hundred and fifty women filled the questionnaire. Their ages ranged between 11-60years with a peak between 21-40years. The duration of first exposure was 1-20years with

repeated application every two to three months to relax the new hair undergrowths. Sixty two percent (155 out of 250) of the women were married while the remaining 38% (95 out of 250) were single. The occupation of the women affected included various professionals, artisans, students and housewives.

Chemical hair relaxers used

The hair straightening products were noted to all contain sodium hydroxide or ammonium thioglycate as the active ingredient. Guanidine hydroxide/carbonate was the other common active ingredient of relaxer chemical used referred to as “no-lye” relaxers. Seventy eight percent of the women stuck to one product while the remaining selected products available when needed. The packaging of the ‘no-lye’ relaxers was as a kit containing an activator for mixing before application. The instruction sheets included information on the precautions, directions on hair preparation before use, time chart for hair relaxation, use of strand test (test on a small section of hair), use of neutralizing shampoo and conditioner. The hair relaxers came in three strengths: mild, regular and super to be used depending whether the hair type is fine, medium or coarse. Super strength was never to be used on fine hair.

Reasons for use of hair relaxers

Reasons for opting for use of chemical hair relaxers included beauty, social acceptability, convenience and ease of management of the relaxed hair. Others are previously tough hair texture, advice of friends and feeling of improved self-esteem.

Adverse effects documented

Self-reported adverse effects included dandruff, itchy scalp, scalp burns, scarring of scalp, weak breaking hair, loss of scalp hair (**Figure 2**) and change in hair colour (**Table 1**). Hair loss was



Figure 1 Healthy styled straightened Negroid scalp hair.



Figure 2 Alopecia in a woman exposed to chemical hair relaxers

Table 1 Adverse effects encountered with the use of chemical hair relaxers.

<i>Side effects</i>	<i>N (%)</i> *
Change in hair colour	135
Hair loss	112
Hair breakage	75
Weakening of hair	69
Scalp pruritus/ irritation	60
Dandruff	37
Scalp burns	25
Scarring of scalp	10

*Some women had more than one adverse effect.

defined as substantial amount to cause alarm to the patient or leave an area of scalp totally without hair.

Discussion

The African-American hair shaft is elliptical or flattened in cross-section and spiral or tightly curled in tertiary structure.¹ A feature of black African hair has an apparent increased fragility of the hair shaft compared to other ethnic groups as measured by the tensile force needed to break the hair fibre.²

Chemical hair straightening is a process of changing naturally curly or kinky hair to permanent straight hair using chemical agents. Chemical relaxers used on the hair in Negroids contain sodium, potassium, or guanidine hydroxides, sulfites, or thioglycolates. All of these chemicals work to produce a straight appearance by affecting the cysteine disulfide bonds of the hair. This process weakens the hair shaft, as the rearrangement of disulfide bonds does not occur without structural damage to the shaft and decrease in tensile strength compared to untreated hair.³

The process leaves the hair dry, weak, and susceptible to breakage. Hair breakage, hair thinning, lack of hair growth, scalp irritation, scalp damage, hair loss are some of the complaints from many who experience problems due to the misuse or chronic use of chemical hair relaxers.⁴ Allergic contact dermatitis to thioglycate products has been reported.⁴ Other complications of chemical hair straighteners with potent chemicals include delapitation, traumatic hair breakages, hair discoloration from bleaching, scalp abrasions, sores and burns especially with chemicals with unacceptably high pH.⁵ One of concerns is the change of hair's pH level. Hair in a healthy state should have a pH of 4.5-5.5. Hair's natural oil, sebum, has a pH of 5. On the pH scale of between 1-14, 1 being the most acid and 14 being the most alkaline, relaxers have a pH of between 8.4 and

14, thus changing hair's naturally slightly acid state to alkaline. This will cause the hair to feel dry, coarse, and in extreme cases cause hair breakage. Necrosis of the scalp has been a reported sequelae.⁶

Hair discoloration appears to be quite high in current series of women with more than 50% occurrence rate (**Table 1**). Hair discoloration and bleaching is as a result of some chemicals inhibiting some stages in the enzymatic synthesis of melanin resulting in depigmentation.⁵ Some hair neutralizers used after application of straighteners with high PH contain shellac which may react with alcohol groups to cause hair discoloration.⁵

Chemical hair relaxers have been documented to cause alopecia. Forty five percent of the women complained about various degrees of hair loss. In 2000, Swee *et al.* reported a major outbreak of hair breakage and alopecia among users of a particular hair straightening product. The severity of the adverse effects from this particular product prompted the Food and Drug Administration (FDA) to remove it from the market.⁷ Nicholson *et al.*⁸ documented chemically induced alopecia in young Afro Caribbean females related to the misuse of chemical hair straightening agents. They typically displayed hair loss in the vertex. Butengo-Ransby *et al.*⁹ also reported another case of chemical and traumatic alopecia from thioglycate in a black woman with unusual clinical and histological findings. The alopecia was verrucal and histology did not show physical characteristics of features seen in other cosmetic products. Some women have a potentiality to ready hair loss from genetic predisposition and incipient common baldness and therefore are more liable to alopecia as a complication. Hair straightening may be a cause

of preventable alopecia and other scalp problems in the Negroid woman.

Allergic contact dermatitis to thioglycate products has been reported.⁴ Irritant contact dermatitis complicated by deep seated staphylococcal infection after the use of chemical hair relaxers was reported in a woman by Kaur *et al.*¹⁰

The use of chemical hair relaxers cuts across all ages of women for different reasons. All the women were aware and reported adverse reactions to the regular application of these chemicals. Body image and self-esteem are not negotiable especially in career women who need cooperate appearance to make an impression in their places of work. However, great care needs to be taken in the use of chemical hair relaxers.

Safety precautions and information on the ingredients used are compulsory on instruction leaflets included in the packaging of chemical relaxers. In general, the more sodium hydroxide used and the higher the pH, the quicker the chemical reaction will take place on the hair, and the greater the danger will be of hair damage. The use of caustic soda preparations on the scalp requires pre-application of protective oil or wax. The users should insist that a strand test using few strands of hair should be carried out before the general application. The relaxer chemical applied must be left for the appropriate amount of time, not longer. The chemical needs to be completely removed with warm water, and then a neutralizing formula is applied as instructed to lower the pH. If the pH is not lowered the hair will break. A conditioner is finally applied to the hair to restore some of the natural oils and proteins removed by the chemical. The action of the chemical agents is expected to be terminated after use with a neutralizer which usually contains oxidizing agents like hydrogen

peroxide, potassium bromate or sodium perborate. If newly chemically straightened hair is not given special treatment it can become brittle, dry, damaged and break. Relaxed hair will tend to be drier and break easily. Women who have allergy to any of the products used should stay away from this practice. Relaxers should never be applied to already damaged hair, or on someone who has had scalp damage.

There are legal implications of the package insert which need to be enforced.¹¹ There is documentation in literature of a hair relaxer being removed from market because of consumers' complaints.¹² Two popular hair relaxer products by World Rio Corporation, after receipt of complaints in November and December of 1994 were removed from market. FDA (Food and Drug Administration) in the United States (US) warned the public against using them because consumers complained of hair loss, scalp irritation, and discolored hair. The California Department of Health also stepped in to stop sales. In January of 1995, the U.S. Attorney's Office in Los Angeles filed a seizure action against these products on behalf of FDA. By then, the agency had received more than 3,000 complaints about the Rio products. A similar strict intervention in Nigeria will go a long way in sanitizing the hair relaxing industry and ensuring healthy hair for women on these products.

References

1. Syed A, Kuhajda A, Ayoub H *et al*. African-American hair: its physical properties and

2. differences relative to Caucasian hair. *Cosmet Toil* 1995; **110**: 39-48.
2. Khumalo NP, Dawber RP, Ferguson DJ. Apparent fragility of African hair is unrelated to the cystine-rich protein distribution: a cytochemical electron microscope study. *Exp Dermatol* 2005; **14**: 311-4.
3. Khalil EN. Cosmetic and hair treatments for the black consumer. *Cosmet Toil* 1986; **101**: 51-8.
4. Dowling JG. Dangers involved in dyes, cosmetics and permanent wave lotions applied to hair and scalp. *Arch. Dermatol* 1951; **63**: 561.
5. Arthur R, Rodney D, eds. *Diseases of Hair and Scalp*. Oxford: Blackwell Scientific Publications; 1982.
6. Ippen H, Suebert A. Kopfhautnekrosen durch Haarbehandlung-eine Erklarungsmoglichkeit *Hautarzt* 1975; **26**: 598.
7. Swee W, Klontz KC, Lambert LA. A nationwide outbreak of alopecia associated with the use of a hair-relaxing formulation. *Arch Dermatol* 2000; **36**: 1104-8.
8. Nicholson AG, Harland CC, Bull RH *et al*. Chemically-induced cosmetic alopecia. *Br J Dermatol* 1993; **128**: 537-41.
9. Bulengo-Ransby SM, Bergfeld WF. Chemical and traumatic alopecia from thioglycate in a black woman: a case report with unusual clinical and histological findings. *Cutis* 1992; **49**: 99-103.
10. Kaur BJ, Singh H, Lin-Greenberg A. Irritant contact dermatitis complicated by deep-seated staphylococcal infection caused by a hair relaxer. *J Natl Med Assoc* 2002; **94**: 121-3.
11. Temple R. Legal implications of the package insert tried. *Clin North Am* 1974; **58**: 1151-9.
12. Kurtzweil P. Hair relaxers destroyed after consumers complain. *FDA Consumer* 1996; **30**: 33-4.