Granulomatous Ochronosis – a Cosmetic-Induced Skin Disorder in Blacks

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SUMMARY

More skin eruptions than previously are appearing in Blacks after the application of a variety of topical cosmetics. Clinical and histological descriptions of these conditions are reviewed and classified. Four cases of sarcoid-like foreign-body granulomas are reported. The stricter control of cosmetics is recommended.

The cosmetics industry has made an extensive variety of products available to consumers in order to cope with an unprecedented demand. The European Common Market has adopted legislation directed to control cosmetic mass production. This legislation (6 October 1972) basically ensures the categorization and definition of cosmetics, the formulation of research programmes, the pharmacodynamic properties of the agents, compulsory labelling of preparations with inclusion of a list of ingredients, instructions on rational use, and the standard of quality and safety acceptability. A list of prohibited agents has also been provided. Clarifying definitions for 'cosmetics', 'medicaments' and 'dermopharmaceutics' have to be provided, and in some countries the registration of products has to be approved by the Ministry of Health.

Without interfering with promotional campaigns, these laws give priority to consumer protection. Nevertheless, advertisements often stress the phenomenal benefits while disregarding the indications of the sites of application, the duration of usage, and usually, the contraindications. In contrast to the optimistic opinion propagated, adverse effects may occur.

We are confronted with an increasing number of skin disorders affecting the Black population. These skin changes occur after exposure or over-exposure to locally manufactured 'beauty' preparations. Many instances of skin damage involving the face and neck of Black women, but less frequently those of men and children, have been recorded in the last few years, and have caused problems. These include: (i) detection of harmful preparations among the many named by patients; (ii) identification of the irritant(s); and (iii) institution of therapeutic, prophylactic and, frequently, psychological measures. In accordance with the experience gained, we have now listed the favoured products on a questionnaire.

The aim of this paper is to illustrate the polymorphic features of skin damage, to provide a guideline for classification and diagnosis, and to report on a variety of cosmetic ochronosis showing the clinical and histological picture of a sarcoid-like reaction.

GENERAL OBSERVATIONS AND CLASSIFICATION

During a period of 2 years, 5463 patients were seen at first consultation; of these 342 (6%) had skin damage related to the use of marketed cosmetic preparations (265 females (mean age 32 years), and 77 adult males and boys (mean age 22 years)). The adults were able to indicate the name of the product(s), the duration of exposure, the time of early skin changes, and the comparative frequency of usage. Products included greasy paraffin derivatives, bleaching creams, lanoline mixtures, and surface moisturizing agents. These were applied singly or in combination with the hope, as indicated on the attached tag, of clearing undesirable patchy hyperpigmentation, curing pimples and changing a dark complexion to one which was 'bright, lovely, and seductive'. Anxious mothers used greasy paraffin derivatives to treat their children's dry skin.

The skin lesions varied in acuteness, distribution and severity depending upon the duration of exposure, vulnerability of cutaneous structures, pre-existing disorders, and the irritant potential of the causative factor(s). Erythema, microvesication, papular rash, patchy pigmentation, and nodular and atrophic changes were frequently seen, and the sites of distribution (face and lateral aspect of the neck) offered essential clues for diagnosis. Occasionally, the clinical features were complicated by a combination of different types of eruptions, or aggravated by incorrect medications causing misinterpretation.

Constitutional symptoms differed from patient to patient. We frequently noted mild or severe pruritus, a painful or burning sensation, or irritability; young women particularly were emotionally disturbed by the aesthetic embarrassment. We have empirically classified these disorders into the following broad categories: category 1: minor, transient, superficial and fairly curable ailments such as erythema, pityriasis-like scaling, vesiculation, and macular patches; category 2: more serious, often disfiguring, incapacitating and permanent conditions such as reticulate poikiloderma, leucomelanoderma, exogenous ochronosis and its undescribed granulomatous variant. These skin conditions respond poorly to treatment and may become irreversible.

The age and sex incidence are shown in Figs 1 and 2. Among the conditions in category 2, we have observed that the frequency of exogenous ochronosis is increasing.
and is a primary cause of discomfort and aesthetic embarrassment and a common reason for absence from work.

Fig. 1. Age incidence (total consultations — 5 463).

Fig. 2. Sex incidence (total consultations — 5 463).

**EXOGENOUS OCHRONOSIS**

First recognized by Findlay et al., and named ‘exogenous ochronosis and pigmented milium’, this condition was related to the continuous use of bleaching creams containing hydroquinone. The active agent was detected and distinguished from the monobenzyl ether of hydroquinone, another bleaching factor responsible for an outbreak of leucomelanoderma. Exogenous ochronosis frequently causes premature ageing of the skin and occurs most often on the face and neck. The clinical, histological and electron microscopic features have already been described. No additional papers have been published either locally or abroad, and we would like to add further observations and comments on this disease, after having reviewed the clinical and histological findings in 43 Black women affected in various degrees by the condition.

We noted that exogenous ochronosis differs in intensity: stage I — erythema and mild pigmentation (Fig. 3) (22 cases); stage II — hyperpigmentation, black colloid milium, and scanty atrophy (Figs 4 and 5) (17 cases); and stage III — as for stage II, and in addition, papulonodular eruptive elements (Fig. 6) (4 cases). The lesions seen at stage III are of two types: those of early onset show distinctive inflammation; those of longer duration are well circumscribed, raised, indurated, brownish, pea-sized elements without evidence of acute inflammation. The latter were observed in patients exposed to bleaching preparations for a period of more than 10 years.

**Laboratory Studies**

Routine blood tests including a full blood count, ESR, liver function tests, serum proteins and electrophoresis, urea and electrolytes, and immunoglobulins were not found to be helpful. Urinalyses were constantly negative. Homogentisic acid was not detected after exposure of urine to atmospheric air. Punch biopsy specimens were taken from 25 of 43 patients (reluctance to have specimens taken from the face was a limiting factor).

Skin specimens were fixed in formalin and the following staining techniques were used: haematoxylin-eosin, PAS, cresyl-violet (for detection of homogentisic acid), \textsuperscript{2} acid orcein-Giemsa, melanin argyrophilic methods, and acid-fast procedures on specimens from stage III.

The histological pictures of exogenous ochronosis (stages I and II) did not differ from those reported by Findlay et al., namely hyperkeratosis with occasional follicular plugging, focal thinning of the epidermis, scattered liquefaction of the basal layer, depletion of melanocyte population, irregular incontinencia pigmenti, and the presence of a variable amount of blocks of ochronotic material.
The pathological finding from specimens of stage III exogenous ochronosis was identical in the newly erupted and chronic lesions; hyperkeratosis with thickening of the stratified squamous epithelium was found. In addition, in the papillary dermis, or slightly deeper, sarcoid-like granulomas in focal distribution were seen surrounding abundant blocks of ochronotic material (Fig. 7). In 3 out of 4 specimens this material was surrounded by epithelioid cells, histiocytes, plasma cells, occasional neutrophils and a few lymphocytes. Multinucleated giant cells actively engulfing ochronotic particles were a prominent feature (Fig. 8). Skin appendages were spared and the perivascular cellular reaction was irregular. The granulomatous reaction was an extremely 'clean' one, clearly indicating that it was a response to the abnormal pigmented brown material.
CONCLUSIONS

Cosmetology, a scientific art strictly affiliated to dermatology, was defined by Voina. In the past, the use of cosmetics by both men and women has been characterized by a wide gulf between the upper classes, who were the foremost users of these preparations, and the rest of the population. With the rise of the middle class, this gap has narrowed, and the effect of cosmetology has never been so universal. Figures released by the European Common Market evaluate the cosmetics sale growth at 110% compared with a 50% rise in food sales.

Cosmetic preparations may be divided into 3 categories, namely creams, lotions and emulsions for care of the skin and hair; make-up preparations such as powders, lipsticks, eye make-up, nail lacquers, for beautifying; and hygienic and toilet preparations which include deodorants, depilatories, and suntan and bath products. In spite of strict legislation and technological controls directed to improve the manufacturing processes, and to provide a safeguard for quality, safety and practice, these preparations still cause many adverse effects. Soaps, lipsticks, beauty creams, perfumes, as well as pure white petroleum jelly, lanoline, and other known or 'secret' irritative or allergenic agents, are frequently mentioned in the literature. Whenever these agents are exposed the investigating task is facilitated, but there is still a large variety of marketed preparations whose formulation is secret. In the absence of a reliable list of ingredients, excipients, preservatives, fixatives and other additives, the evaluation of the agents, such as their concentration, their absorption and solubility, and their coefficient of partition, is impossible. Skin tests are impractical.

In collecting our data we have had to rely upon the correlation of clinical and histological features rather than on bio-assays. We have had to consider the morbidity rate among Blacks and compare it with the incidence (almost negligible) among Whites not using the particular range of products, and to pay attention to the distinctive skin eruptions after exposure to the preparations frequently mentioned by the patients. Bleaching creams containing an unknown concentration of hydroquinone were taken into account as a primary cause for exogenous ochronosis. Bearing this in mind, and paying attention to the figures for incidence of skin disorders reported elsewhere, we may assume that the skin of Blacks is particularly vulnerable to exposure to agents which in one way or another affect the process of melanogenesis (phenol derivatives, phenolic structured compounds). This action may precipitate a series of events leading to minor as well as to more serious and/or permanent skin damage, depending upon the duration and combination of products.

After a long period of exposure to locally produced bleaching creams, sarcoid-like foreign-body granulomas may develop in the skin. Their gross clinical appearance and the histological features are indistinguishable from similar chronic reactions produced by other causative agents (beryllium, silica, talc, or silicone). Nevertheless, the ochronotic pigment, distinctively stained by routine techniques, firmly binds to dermal fibres. These findings are essential for diagnosis. Special staining methods failed to confirm the elastic nature of the involved fibres, but the orcein affinity may favour the elastic fibres.

In view of these conclusions, we wish to convey some recommendations in order to reinforce the existing legislation, and for the benefit of both the consumer and manufacturer: (i) cosmetic products should be tested for harmful properties before they are released for public use; (ii) a list of all the ingredients must be provided; (iii) an additional tag must provide an impressive warning of possible adverse effects, clear instructions for usage, and the duration and sites of application; (iv) technological controls for the standards of stability and acceptability must be enforced; and (v) educational programmes in cosmetology and an examination should be established so that this scientific art can be practised by trained persons or licensed operators.

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REFERENCES