

THE EFFECT OF BETAMETHASONE VALERATE ON SEBORRHOEIC DERMATITIS OF THE SCALP

A Clinical, Histopathological and Cell Kinetic Study

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Abstract. Eighteen patients with dandruff or seborrhoeic dermatitis of the scalp were treated for 2 weeks with either an application containing betamethasone valerate or an indistinguishable placebo preparation. The betamethasone valerate preparation improved all 10 of the patients who received it and proved statistically significantly better than the placebo preparation. Biopsies were taken from all patients at the beginning and at the end of the trial. A greater improvement was found in the histological appearance of scalp skin in patients treated with betamethasone valerate than in those treated with placebo. In 14 patients an autoradiographic assessment of epidermal proliferation was made before and after the treatment period by the intracutaneous injection of tritiated thymidine and subsequent biopsy of the injected area. The mean labelling indices of the scalp skin before treatment were 17.2% and 16.6% for the betamethasone valerate treated group and the placebo treated groups, respectively. After the treatment period the labelling indices were 7.9% and 13.6% for the steroid- and placebo-treated patients.

Persistent scaliness of the scalp accompanied by a variable degree of pinkness of the scalp skin, "dandruff", is amongst the commonest of skin complaints.

It has been regarded as a mild variety of seborrhoeic dermatitis and, histologically, eczematous changes are found (4). Plewig & Kligman (7) found that there was a high rate of epidermal cell production in this disorder. They studied its reaction to selenium sulphide preparations but, on the whole, little attention has otherwise been paid to the condition. Topical corticosteroid preparations are effective therapeutic agents for all types of eczema, though their mode of action is not well understood. They are often prescribed for seborrhoeic dermatitis of the scalp and this investigation was designed objectively to test their effectiveness and to learn about the way they work.

PATIENTS AND METHODS

Topical applications used

The preparation tested contained betamethasone valerate 0.1% in an alcoholic solution (Betnovate Scalp Application). This active preparation was compared with a placebo which was identical apart from the steroid component. Active or placebo lotions were randomly allocated to the patients as they entered the trial. The study was double blind—neither the patient nor the investigators knew the identity of the applications. Patients were instructed to use the preparation twice daily and to massage gently a small quantity into the scalp skin. No special instructions were given as far as shampooing was concerned and no other treatments were permitted.

Patients

Eighteen patients with persistent scaliness of the scalp and who complained of itchiness were accepted into the study. The scalp skin of most of these patients was slightly pink and in two cases it was oozing and crusted.

Originally it was intended that the skin of all patients be examined autoradiographically after intracutaneous injection of tritiated thymidine. This ideal was not attained but it does explain the preponderance of patients over the age of forty included in the study (younger patients being excluded for ethical reasons). The nature of the investigation was carefully explained to all patients and their informed consent was obtained. There were 4 women and 14 men and their average age was 53.7 years.

Histological and autoradiographic investigations

Four mm punch biopsies were taken from representative areas of the scalp of all patients at the start of treatment and at the end of the 2-week trial period. In 14 patients the biopsy sites were injected intracutaneously with 10 μ Ci of tritiated thymidine (22 Ci/mmol spec. act., Batch Nos. 19 & 24, The Radiochemical Centre, Amersham) 50 minutes before biopsy in order to label cells autoradiographically in the premitotic DNA synthesis phase. Biopsies were processed by routine histological methods and haematoxylin and eosin stained sections were examined. Autoradiographs were prepared by the dipping film method (3), using Ilford K2 nuclear

Table I. Histological scores before and after treatment

	Patient No.	Scores	
		Before	After
Betamethasone valcrate treated group	1	5	0
	2	1	0
	4	5½	1½
	7	5	0
	8	6	7
	13	3½	0
	14	4½	4½
	19	4	2
	20	5	1
	23	7	½
	272	3½	½
Mean patient score		4.5	1.8
Placebo-treated group	3	6½	5½
	5	7½	4
	6	5½	8
	11	8	2½
	15	2½	½
	18	3½	3½
	23	4½	1½
Mean patient score		5.4	3.7

emulsion. Exposure times were for 2, 3, and 4 weeks, after which they were developed in Kodak D.19 developer.

Clinical assessment

Notes were kept of the presence of scalp scaliness, its extent, the presence of erythema of the scalp, and any symptoms. At the end of the trial, a clinical assessment was made of each patient using a numerical score according to the following arbitrary scale: 0 = no change, -2 = much worse, -1 = worse, +1 = improved, +2 = much improved.

Histological assessment

Biopsies were assessed before the code was broken. Special note was made of the following histological features: spongiosis, acanthosis, parakeratosis, and dermal inflammatory infiltrate.

Each feature was given a score according to an arbitrary scale: 0 = normal, 1 = mild change, 2 = severe change. Where the observers disagreed in the assessment of a feature, the mean of the two assessments was taken and 'half-values' were permitted.

Autoradiographic assessment

Autoradiographically labelled basal and suprabasal cells were counted in the interfollicular epidermis and expressed as a proportion of the number of basal cells present (labelling index). At least 1 000 basal cells were counted in each biopsy.

RESULTS

Clinical

Ten patients received betamethasone valcrate scalp lotion. Six were 'much improved' and 4 were 'improved'. The score on the basis of the arbitrary

Table II. Labelling indices before and after treatment

	Patient No.	Labelling indices (%)	
		Before	After
Betamethasone valcrate treated group	2	4.1	5.0
	4	24.4	8.4
	8	12.3	6.8
	13	10.3	5.4
	14	13.5	15.0
	19	18.7	7.2
	20	23.6	6.2
	272	30.7	9.8
Mean patient L.I.		17.2	7.9
Placebo-treated group	3	4.8	5.1
	5	15.7	5.3
	6	25.9	43.4
	11	35.0	13.7
	15	6.4	4.9
Mean patient L. I.	18	11.8	9.6
		16.6	13.6

scale was '16'. (It would have been 20 if all had been 'much improved'.)

Eight patients received placebo lotion, one out of 8 was 'much improved', 3 were 'improved', one showed 'no change', one was 'worse' and 2 were 'much worse'. The score on the basis of the arbitrary scale was '0' (out of a possible 16 if all had 'much improved'). The difference between the two groups was significant in favour of the active treatment ($p=0.05$).

Histological assessment

The mean post-treatment score of the betamethasone valcrate treated group was lower than that of the placebo-treated group but the difference is not statistically significant. The post-treatment scores were less than the pre-treatment scores in both groups (Table I).

The pre-treatment biopsies showed epidermal oedema. Individual cells seemed to be swollen although there was not a great deal of spongiosis. Other than this feature, the change did not differ from those of any other type of eczema. The post-treatment biopsies showed no special feature worthy of comment.

Autoradiographic assessment

There was a fall in the labelling indices in both groups after treatment but the difference in these values was more striking in the steroid-treated patients (Table II).

DISCUSSION

Dandruff appears to represent a mild degree of eczema of the scalp; a more severe form is seborrhoeic dermatitis. Most types of eczema are improved by the application of topical corticosteroids, although their mode of action is unknown. Some of these preparations have been found empirically to help dandruff and seborrhoeic dermatitis and for this reason we decided to undertake the study described in this paper.

This investigation showed that seborrhoeic dermatitis of the scalp was significantly improved in patients treated with betamethasone valerate application as compared with its unmedicated base. The clinical improvement after 2 weeks' treatment with the steroid was generally accompanied by a fall in the labelling index and a return to a more normal histological appearance. Although the difference between the active- and placebo-treated patients in these two respects was not statistically significant the trend was in favour of the active lotion. A greater difference would probably only be apparent in a larger series as the interpatient variation, particularly in labelling indices, was quite considerable.

Ackerman & Kligman (1) found that severe dandruff was accompanied by an increased rate of epidermal cell production. Subsequently, it was found that a topical preparation formulated to treat dandruff and containing selenium sulphide reduced the increased epidermopoiesis (7). The present study has shown that although there is no exact correlation, the clinical and histological improvement is paralleled by a decrease in the autoradiographic labelling indices. Whether this decrease in cell proliferation is secondary to healing of the eczema or is a primary action of betamethasone valerate and is partially

responsible for the clinical improvement, is impossible to say. It is now well known that corticosteroids have an antimitotic effect on the epidermis (2, 5, 6). However, it may well be that other anti-inflammatory actions of the corticosteroids are more important when considering their effect on an inflamed epidermis.

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