The Effect of Cyproterone Acetate on Hair Roots and Hair Shaft Diameter in Androgenetic Alopecia in Females

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Twenty female patients suffering from androgenetic alopecia were treated during one year with 50 μg ethinyloestradiol plus 2 mg cyproterone acetate and additional 20 mg cyproterone acetate on days 5–20 of the menstrual cycle. The control group consisted of eight untreated female patients with androgenetic alopecia. The parameters used to evaluate therapeutic results were trichogram, hair shaft diameter of full anagen and number of hairs measuring less than 40 μm. Hair roots were epilated from two locations of the scalp: fronto-cranial and left temporal (reference point). The trichogram of the fronto-cranial scalp region showed an increase of anagens as well as a decrease of telogens. These changes were statistically highly significant. Further, there was a decrease of dysplastic/dystrophic forms. The left temporal scalp region showed no significant differences. The mean hair shaft diameter of full anagen ($n=8$) increased, while the number of hairs measuring less than 40 μm ($n=8$) decreased. The last two findings showed no statistically significant differences. The therapeutic results warrant the conclusion that cyproterone acetate seems to be effective in androgenetic alopecia in women.

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Androgenetic alopecia in females has been accepted as belonging to the syndrome known as hyperandrogenism. Hyperandrogenism is an androgen-mediated complex of symptoms such as hirsutism, acne seborrhoea and androgenetic alopecia. However, the genetical expression of these symptoms may vary widely. Androgenetic alopecia results from increased sensitivity of hair follicles to androgen steroids in the fronto-cranial scalp region in genetically predisposed women (1). Many female patients complain about hair loss and ask for treatment. Often the diagnosis has been stated as a diffuse alopecia. Therefore, correct diagnosis is necessary before treatment starts.

The diagnosis androgenetic alopecia is mainly based on the history, clinical picture and the trichogram. The characteristic pattern of hair loss in androgenetic alopecia starts with a decrease in the density of implantation and diminution of the hair shaft diameter on the cranial region of the scalp (2, 3). Obviously there is a wide variation in diameter of the interindividual hair shafts (4). Further, there is a progressive decrease in follicular size with each hair growth cycle while the time of each cycle is gradually shorter. Along the frontal hairline a well preserved fringe of hair is quite characteristic (3, 5). The trichogram is an objective method to confirm the diagnosis. On the cranial scalp region there is an increase of telogens and/or dysplastic/dystrophic forms. On the left temporal scalp region (reference point) the trichogram shows normal values (6). Therapy studies have shown that not only the trichogram, but especially the hair shaft diameter is the most sensitive parameter in evaluating results (7, 8).

Cyproterone acetate (CPA) competes with androgens for the cytoplasmatic receptor sites in hair follicles (9). Since CPA is available on the market its beneficial effect in the treatment of hirsutism and acne has been proved in clinical studies (10). An optimal dosage scheme of CPA for women suffering from androgenetic alopecia is not yet known. Low CPA dosages are believed to give better results than high dosages (9, 11). In this study the role of cyproterone acetate will be considered and studied on the basis of parameters such as trichogram, hair shaft diameter, the number of hairs less than 40 μm in diameter and subjective findings, compared with a non-treated control group.

PATIENTS AND METHODS

On the basis of clinical features and trichogram consistent with androgenetic alopecia, thirty female patients were selected in retrospect (mean age 33, range 18–40 years). Twenty patients were treated with 50 μm Ethinyl Oestradiol (EO) plus 2 mg CPA on days 5–27 and an additional 20 mg CPA on days 5–20 of the menstrual cycle. Ten patients (control

Table I. *Trichogram (%) before (B) and after (A) treatment for one year with Diane and additive cyproterone acetate 20 mg d.d. (days 5–20) (n=20) compared with the control group (n=8) on the cranial scalp region*

SEM: Standard error of the mean of the differences between the initial values and those obtained after one year

Mean	Treated group		Control group		Student's *t*-test
	B	A	B	A	
Anagen	49.7	74.4	60.4	48.8	
SEM	±4.8		±5.7		$p<0.0001$
Catagen/telogen	29.6	16.7	24.9	41.3	
SEM	±3.6		±4.5		$p<0.0000001$
Dysplastic/dystrophic	20.5	9.0	13.5	10.0	
SEM	±2.4		±3.4		$p=0.07$

group) were left untreated. The patients fulfilled the following criteria: no endocrine disorders, concomitant diseases, pregnancy and/or use of medication.

Before the start of the study and one year later hair roots were removed by a standardized method (6) from two locations, the cranial scalp and left temporal scalp region (reference point). The trichogram was assessed at 40-fold magnification. The hair shaft diameter was measured at 100-fold magnification, using a measuring eyepiece with screw micrometer. The hair shaft diameter was measured immediately above the hair root sheath in full anagen, where the shaft is of constant diameter. A single measurement proved to be sufficient (12).

All measurements were performed by the same investigator and the following parameters were used. The trichogram, the hair shaft diameter in full anagen, and the number of hairs less than 40 μm in diameter. Student's *t*-test was used in statistical analysis.

RESULTS

Tables I and II show the trichogram of the cranial and left temporal scalp region respectively of the treated group (TG) and control group (CG), the standard

error of the mean (SEM) of the differences between the initial values and those after one year. The TG showed a marked increase in the number of anagens and a decrease in the number of telogens, especially in the cranial scalp region. Highly statistically significant differences between the initial values (B) and those obtained after one year (A) were observed in the cranial scalp region in the TG. In addition there was a marked diminution of the number of dysplastic/dystrophic hair forms in both regions. The CG showed a decrease in the number of anagens and a marked increase in the number of telogens in the cranial scalp region, not on the left temporal scalp region. The number of dysplastic/dystrophic hairs was diminished slightly in both regions. The differences of the latter findings were not statistically significant.

Figs. 1 and 2 show the hair shaft diameter (μm) in full anagen before and one year after treatment in the cranial and left temporal scalp region respectively. Fig. 1 shows an increase in the treated group and a decrease in the control group. Fig. 2 shows a decrease

Table II. *Trichogram (%) before (B) and after (A) treatment for one year with Diane and additive cyproterone acetate 20 mg d.d. (days 5–20) (n=20) compared with the control group (n=8) on the left temporal scalp region*

SEM: Standard error of the mean of the differences between the initial values and those obtained after one year

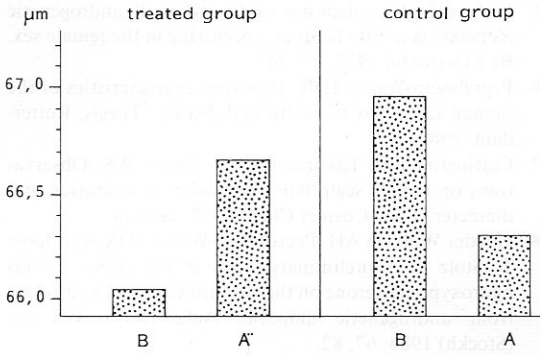| Mean	Treated group		Control group		Student's *t*-test
	B	A	B	A	
Anagen	64.7	75.0	65.8	65.8	
SEM	4.8		7.4		$p=0.2$
Catagen/telogen	17.5	15.3	14.1	15.1	
SEM	2.7		3.9		$p=0.5$
Dysplastic/dystrophic	17.9	9.8	20.1	17.9	
SEM	3.2		4.6		$p=0.3$

Fig. 1. Mean hair roots before (B) and after (A) one year treatment with Diane and additive cyproterone acetate 20 mg d.d. (days 5–20) (*n*=8) compared with the control group (*n*=8) on the *cranial* scalp region.

in both groups. The differences between the initial values and those obtained after one year were not statistically significant either in the TG or in the CG.

Hairs measuring less than 40 μm in diameter account for 10% of the total number of hairs in normal persons. Figs. 3 and 4 show the number of hairs measuring less than 40 μm in diameter before and one year after treatment in the cranial and left temporal scalp region respectively. Fig. 3 shows a slight decrease in the TG and a slight increase in the CG. In these observations the differences before and one year after treatment were not statistically significant.
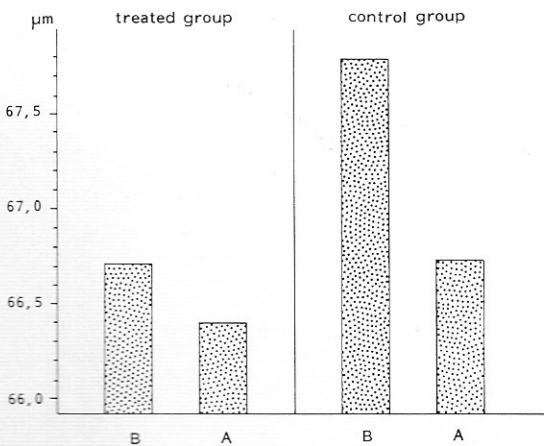
Side effects in the first three or four months of

Fig. 2. Number of hairs less than 40 μm in diameter before (B) and after (A) one year treatment with Diane and additive cyproterone acetate 20 mg d.d. (days 5–20) (*n*=8) compared with the control group (*n*=8) on the *cranial* scalp region.
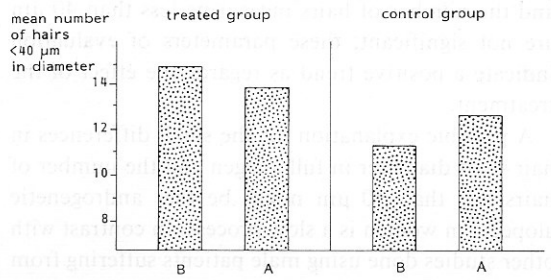

Fig. 3. Mean hair shaft diameter in full anagen hair roots before (B) and after (A) one year treatment with Diane and additive cyproterone acetate 20 mg d.d. (days 5–20) (*n*=8) compared with the control group (*n*=8) on the *left temporal* scalp region.

treatment were increase of bodyweight (6×), dizziness (1×), nausea (2×) and perspiration (1×).

The symptoms were transient. It was not necessary to stop treatment. In twelve patients out of the TG (*n*=20), hair growth was markedly improved, in six of them hair loss stopped, while in two patients hair loss did not change. In all patients of the CG (*n*=10) hair loss continued.

DISCUSSION

In hair research it is necessary to have objective data to evaluate therapeutic results. The highly significant differences between the initial values and those obtained one year later on the cranial scalp region—an increase in anagens and a decrease in telogens—and subjective findings show the beneficial influence of CPA on the hair growth on the cranial scalp region of females with androgenetic alopecia. Although these differences of the hair shaft diameter in full anagen
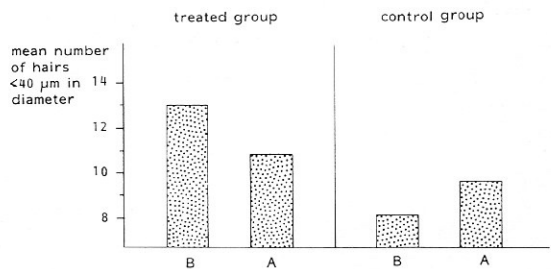

Fig. 4. Number of hairs measuring less than 40 μm in diameter before (B) and after (A) one year treatment with Diane and additive cyproterone acetate 20 mg d.d. (days 5–20) (*n*=8) compared with the control group (*n*=8) on the *left temporal* scalp region.

and the number of hairs measuring less than 40 μm are not significant, these parameters of evaluation indicate a positive trend as regards the effect of the treatment.

A possible explanation for the small differences in hair shaft diameter in full anagen and the number of hairs less than 40 μm might be that androgenetic alopecia in women is a slow process. In contrast with other studies done using male patients suffering from androgenetic alopecia, we found a correlation between objective and subjective data (13).

In order to eliminate seasonal influences we chose to evaluate these parameters before treatment and one year later (14). Since there is, until now, no optimal CPA dosage scheme for women suffering from androgenetic alopecia we consider it advisable that various CPA dosages are compared in double blind placebo-controlled follow-up studies of larger series of patients.

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