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African hair growth parameters

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Summary

Background Hair growth parameters have been studied mostly in caucasian hair, whereas few data on African hair have been reported in the literature.

Objectives To evaluate hair growth characteristics of African volunteers born in Africa.

Methods Thirty-eight young adults (19 women, 19 men, mean ± SD age 27 ± 10 years), native of central and western Africa, took part in the study. Phototrichograms were performed in order to record three parameters of hair growth: hair density, telogen percentage and rate of growth. For each volunteer, three regions of the scalp, namely vertex, temporal and occipital areas, were assessed.

Results Hair density varied from 90 to 290 hairs cm^{-2}, with higher counts on the vertex. No significant difference between men and women was recorded. Telogen percentage showed wide variations, from 2 to 46%, with higher levels on the temporal area and in men. The rate of growth fluctuated from 150 to 363 $\mu m\ day^{-1}$ with no difference related either to gender or to scalp region. These data were compared with those previously obtained in caucasian volunteers of comparable age, and showed significant differences between the two ethnic groups in all three parameters studied. Hair density in African volunteers was lower than that in caucasians (mean ± SD 190 ± 40 and 227 ± 55 hairs cm^{-2}, respectively). African hair grew at a much slower rate than caucasian hair (mean ± SD 256 ± 44 vs. 396 ± 55 $\mu m\ day^{-1}$), and telogen counts were frequently higher in African hair (mean ± SD 18 ± 9% vs. 14 ± 11%).

Conclusions This study demonstrated significant differences between African and caucasian hair growth parameters, which might suggest a trend towards increased hair loss in Africans, even though it contrasts with a lower and slower incidence of the development of alopecia in Africans.

Key words: African hair, hair cycle, hair rate of growth, phototrichogram, scalp hair density

Various studies and reviews have been published that have addressed African hair characteristics, grooming habits or specific defects of the hair shaft.[1–6] However, little is known about the process of hair growth in Africans, most particularly about the rate of growth, anagen/telogen ratio and hair density.[7,8] This study aimed to describe the major patterns of hair growth in 38 healthy African volunteers of both sexes, born in central and western Africa.

Subjects and methods

Volunteers

Thirty-eight volunteers (19 women and 19 men), native of central and western Africa, living in Paris and its suburbs, participated in the study which was carried out during Spring 1999. They were aged 18–59 years, but nearly two-thirds were less than 25 years old (mean ± SD 27 ± 10 years). All were healthy and free from any systemic or cutaneous disease. They were instructed about the purpose and the details of the study, and gave informed consent. About half of the men exhibited androgenetic alopecia (AGA) type III (eight subjects) or IV (one subject), according to the Hamilton classification.[9] The women showed no sign of either AGA or diffuse feminine alopecia.

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Method of evaluation

The phototrichogram technique was used.[10–12] Briefly, hairs from a small area of the scalp (about 1 cm^2) were

cut trim with the skin surface. A macrophotograph of this area was taken immediately, followed by another 2 days later. The comparison of these two pictures, through individualization of hair by image analysis,[13] enabled quantification of the hair density (hairs cm^{-2}), the number of hairs that have grown during these 2 days (referred to as anagens) and those that have not (referred to as telogens). Telogen percentage, hair density and rate of growth, expressed in $\mu m\ day^{-1}$ (half the length increase of growing hairs during a 2-day period), were recorded and analysed in the present study.

In order to assess possible variations according to scalp region, the same method was used on each subject, in three different areas, namely vertex, temporal (right or left) and occipital regions.

Statistics

Statistical analysis was carried out using SAS V6·12 and SPSS V10·0. Wilcoxon and Friedman tests were used, with a 5% threshold of significance. A first analysis compared the three different scalp regions under study, in all 38 volunteers. A second analysis compared data from the vertex and occipital areas of volunteers in this study with those recorded previously (unpublished data) on the same scalp regions in caucasians of comparable age, using the same phototrichogram technique.

Results

Comparison of the three scalp regions among the 38 African volunteers

The data (mean ± SD, range) shown in Table 1 demonstrated the following features.

Hair density was highly variable (from 90 to 290 hairs cm^{-2}, mean ± SD 187 ± 42), and significantly higher on the vertex than on occipital and temporal areas. This criterion did not distinguish men from women, but women showed a higher hair density in the occipital region than men, and a lower one at the temporal site.

Irrespective of the region measured, the percentage of hair in telogen phase varied greatly (from 2 to 46%, mean ± SD 19 ± 9%), and men showed significantly higher counts than women. Significantly higher values were found in the temporal area as compared with the vertex.

Rates of growth varied from 150 to 363 $\mu m\ day^{-1}$ (mean ± SD 260 ± 43). In general, this parameter did not clearly differentiate men from women or vary between scalp regions. However, the occipital area in men showed a lower rate than in women.

As summarized in Figure 1, men with AGA (nine having type III or IV) differed significantly from the 10 unaffected men for the three parameters (density, telogen count, rate of growth), irrespective of the scalp region. The vertex appeared to be the area where the differences between these two subgroups were greatest: men with AGA showed a decreased hair density associated with an increased telogen count and a slower rate of growth.

The cohort studied was too small and varied in age to allow an assessment of the influence of age. However, the six volunteers older than 35 years showed a lower hair density (mean ± SD 175 ± 54 hairs cm^{-2}) and a slower rate of growth (mean ± SD 233 ± 31 $\mu m\ day^{-1}$) than the younger ones (189 ± 40 hairs cm^{-2} and 265 ± 43 $\mu m\ day^{-1}$, respectively). A complementary study, based on a much larger population, is needed to confirm such a trend.

Table 1. Hair growth parameters (mean ± SD, range) in African volunteers ($n = 38$), 19 men (M) and 19 women (F), in three scalp regions

	Density (hairs cm^{-2})			Telogen hairs (%)			Rate of growth ($\mu m\ day^{-1}$)		
	$n = 38$	19 M	19 F	$n = 38$	19 M	19 F	$n = 38$	19 M	19 F
Vertex	204 ± 42 114–290	205 ± 36 146–290	202 ± 49 114–286	17 ± 9 2–39	20 ± 9 7–39	13 ± 6 2–26	260 ± 39 163–356	255 ± 36 163–325	265 ± 42 183–356
Temporal area	181 ± 47 112–286	191 ± 46 126–286	171 ± 48 112–280	20 ± 10 2–44	25 ± 10 11–44	16 ± 7 2–28	268 ± 40 188–363	273 ± 42 224–363	263 ± 38 188–333
Occipital area	176 ± 33 90–242	164 ± 32 90–230	187 ± 30 136–242	19 ± 9 2–46	23 ± 9 13–46	16 ± 8 2–33	252 ± 48 150–342	239 ± 46 150–330	266 ± 48 187–342
Area effect	$P = 0{\cdot}001$			$P = 0{\cdot}034$			NS		
Three pooled areas	187 ± 43	187 ± 42	187 ± 44	19 ± 9	22 ± 10	15 ± 7	260 ± 43	255 ± 43	265 ± 42
Sex effect			NS		$P = 0{\cdot}0001$			NS	

NS, not significant.

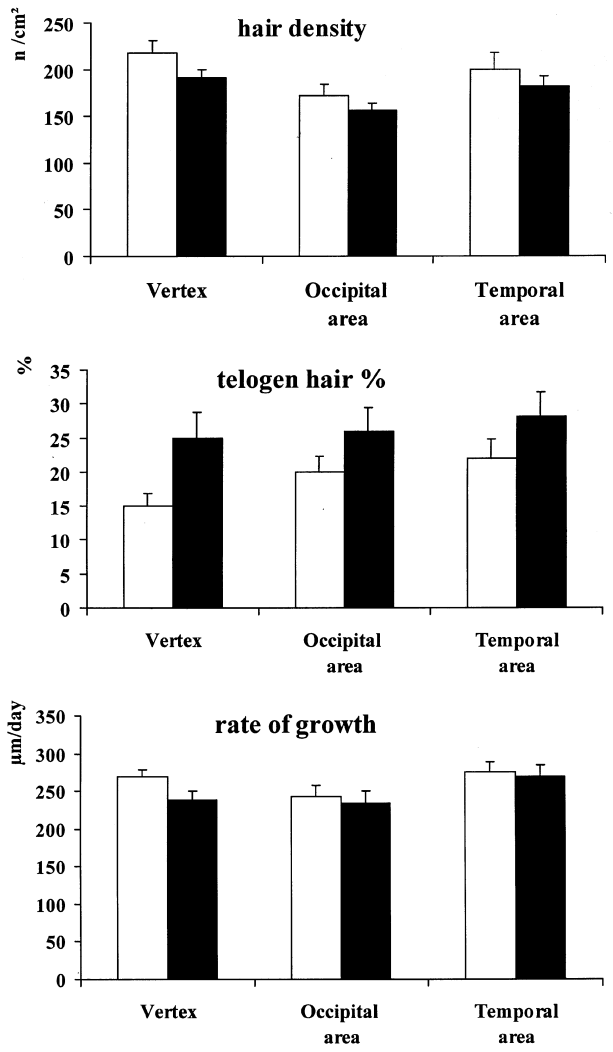

Figure 1. Hair growth parameters (mean ± SEM) in three scalp regions of 19 African male volunteers: comparison between 10 men without alopecia (open bars) and nine men with alopecia (filled bars).

Comparison between African and caucasian hair

The results obtained in the present study were compared with previous (unpublished) data obtained in a caucasian population of comparable size, gender distribution (45 subjects: 23 women and 22 men), and age (mean ± SD 28 ± 9 years). As indicated in Table 2, these two ethnic groups differed significantly in various criteria of hair growth.

African subjects showed a lower hair density than caucasians (mean ± SD 190 ± 40 vs. 227 ± 55 hairs cm^{-2}, respectively), and a much lower growth rate (mean ± SD 256 ± 44 vs. 396 ± 55 µm day^{-1}, respectively). Such differences are statistically significant, irrespective of either scalp region or gender.

With regard to telogen counts, ethnic variations were observed, depending on scalp region: occipital areas in Africans (women and men) showed increased values as compared with caucasians. In the vertex region, the same variation was observed in women (mean ± SD 13 ± 6% in Africans vs. 7 ± 4% in caucasians), whereas with regard to men, the difference between the two ethnic groups was reversed: caucasians showed higher counts than Africans (mean ± SD 25 ± 13% vs. 20 ± 9%, respectively). This seems to reflect a more advanced stage in the development of alopecia among caucasians, as compared with Africans of comparable age. In fact, the caucasian male cohort included nine affected with AGA, but with a different distribution, indicating more pronounced stages of alopecia (one was type III, seven were type IV and one was type VI, according to the Hamilton classification[9]).

Table 2. Comparison between African and caucasian hair growth parameters (mean ± SD, range) in two scalp regions

		Density (hairs cm^{-2})	Telogen hairs (%)	Rate of growth (µm day^{-1})
Vertex	Africans	204 ± 42	17 ± 9	260 ± 39
	$n = 38$	114–290	2–39	163–356
	Caucasians	243 ± 58	16 ± 13	397 ± 51
	$n = 45$	98–344	1–50	300–494
Occipital area	Africans	176 ± 33	19 ± 9	252 ± 48
	$n = 38$	90–242	2–46	150–342
	Caucasians	216 ± 52	11 ± 7	402 ± 61
	$n = 45$	118–332	0–31	281–537
Two pooled areas	Africans	190 ± 40	18 ± 9	256 ± 44
	$n = 38$			
	Caucasians	227 ± 55	14 ± 11	396 ± 55
	$n = 45$			
Ethnic group effect		$P = 0.0001$	$P = 0.0001$	$P = 0.0001$

Discussion

When compared with subjects in a comparable caucasian cohort, our data indicate that the status of hair growth and hair density among African volunteers appears statistically different: African hairs grow at a slower rate and are more frequently found in the telogen phase. The total hair density appears lower than in caucasians, which is in agreement with the findings of Sperling[7] and Bernstein and Rasmann.[8] The two ethnic groups also seem to show slight discrepancies in hair status according to scalp sites.

As far as global hair 'volume' is concerned, an index may be estimated by multiplying hair density by the rate of hair growth, integrating both factors. Such an index would lead to a nearly twofold difference in hair 'volume' between the two populations, for both sexes (53,040 vs. 96,471 in Africans and caucasians, respectively, based on data found on the vertex). However, this crude and theoretical index does not take into account additional factors such as curliness, which plays a great part in the visual perception of global hair 'volume'.

In contrast, our data also show similarities between the two ethnic groups. With regard to gender, African men appear, like caucasians, more prone to AGA than women, and AGA, like ageing seems to lead to a decrease in hair density and a slow-down of rate of growth.[14–17] In Africans, as in caucasians,[16] hair parameters are clearly not homogeneous, and vary according to scalp region.

As the volunteers in the present study may be considered as young adults, the differences in hair growth characteristics could suggest, *a priori*, an inherited increased prevalence of AGA in Africans, as compared with caucasians. This, however, does not seem to be the case. Our own data on caucasian subjects indicate that, at a similar age, they present statistically higher grades of severity of AGA. The data obtained in this study depict more an instant 'snapshot' of hair status, rather than an image of alopecia during the life-span. Despite such apparent features of hair growth, the development of alopecia with age may be slower in Africans than in caucasians, as previously suggested by Sety.[18] This study, as well as that of Hamilton,[9] which compared alopecia among Asiatics and caucasians, should be repeated and applied to various ethnic groups. It cannot be excluded that, among the same ethnic group, hair status may vary greatly. Generally speaking, we still lack information about hair cycles (duration, seasonal fluctuations, ageing, alopecia) among ethnic groups, as most studies on hair have been too narrowly focused on caucasian hair.[14–17,19,20]

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