Original Research Article

A study of the Geheimratsacken angle as predictor for early diagnosis of androgenetic alopecia in adolescent population

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Abstract

Background: Aim: To Know the role of Geheimratsacken angle (Fronto-Temporal Denudation)in hairline recession of adolescents. To know the morphology and latest trends of hairline pattern in adolescent population. **Material:** Specially designed measuring spectacle, Measuring tape, Skin marking pencil, Compass divider. **Method:** Equally represented 350 healthy subjects were examined between 12 to 19 years age. Using Frankfurt's horizontal plane, the hair line drawn was measured from glabella for 0 to 180 degree with measurement of head circumference. **Results:** The recession starts at the Right and Left Gehiemratsacken Angles and is observed at more than one degree points. The highest recession seen at the Left Gehiemratsacken Angle, makes it a marker for identification of the earliest manifested hair line recession. **Conclusion:** The age of onset of hair line recession is 14-15 years. The hair line recession in the subsequent ages become most marked as found in 16-17 years and 17-18 years. The highest recession is seen at the Left Gehiemratsacken Angle. As the specific findings of hair line pattern and the age of its onset are found out, it can be of great use for prevention of Androgenetic Alopecia through observance of timely intervention in vulnerable adolescents.

Key words: Androgenetic Alopecia, Frontal hairline, hairline recession, Geheimratsacken Angle.

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INTRODUCTION

Hair loss is cosmetically and psychosocially distressing condition.Alopecia areata unpredictable,non scarring form of hair loss, affects all age groups, prevalence in children and adolescents.[1]. Androgens have profound effects on scalp and body hair. Scalp hair grows constitutively in the absence of androgens, while body hair growth is dependent on the action of androgens. Androgenetic alopecia, referred as male pattern hair loss (MPHL) is due to the progressive miniaturization of scalp hair. The overall incidence of AA was 20.2 per 100,000 person-years and not changed.[2]. AA is ideal for study, the target organ is visible and accessible, the onset, remissions, and relapses of the disease can be seen easily. The frontal alopecia of adolescents is forerunner of common baldness , called "male pattern baldness".Progression of the hair loss in the frontal region and its merging with the gradually enlarged bald spot on the vertex leads to the common pattern of baldness.[3,7].

MATERIAL AND METHODS

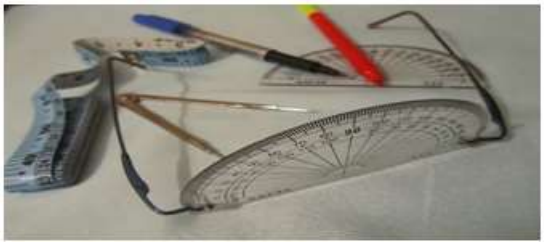

Figure 1:

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Materials used for the study: specially designed spectacle to measure the exact angle , measuring tape, compass, skin marking pencil and marker pen study was conducted on Persons of age between 12 years to 19 years.50 subjects for each age group.These subjects were perfectly healthy and from same socio- economic status. Permission from Ethical committee obtained and due consent from parents and Teachers, the Frankfurt's horizontal plane, obtained by joining the infra-orbital margin to the upper margin of the external acoustic meatus and was taken as the standard anatomical position for measuring the hairline recession and its pattern.

Photograph 1: showing marking of hairline at Gehiemratsacken angle; **Photograph 2:** Showing measurement of hairline recession at 40 degree

RESULTS AND OBSERVATIONS

Table 1: CORRECTED HAIR LINE RECESSION : AGE GROUP WISE IN PERCENTAGE(%)

Group*	%@0	%@10	%@20	%@30	%@40	%@50	%@60	%@70	%@80	%@90	%@100	%@110	%@120	%@130	%@140	%@150	%@160	%@170	%@180
A	2.75	1.82	1.72	3.17	1.12	2.61	3.18	2.28	1.76	7.50	3.66	4.15	4.46	4.83	0.50	-0.99	4.56	6.25	1.52
B	12.47	15.37	27.91	16.20	23.48	17.67	-5.60	17.07	24.79	9.94	21.47	12.68	13.97	18.28	22.96	23.39	10.51	14.20	13.41
C	0.669	24.28	11.76	20.09	23.35	36.29	27.03	11.76	6.15	18.19	21.64	18.04	22.58	27.81	37.22	6.10	20.02	.23.29	28.74
D	44.54	22.94	9.759	12.22	11.19	17.26	42.13	11.67	21.40	32.56	8.18	3.06	13.06	14.36	6.49	14.87	6.77	19.95	16.43
E	22.35	19.24	34.54	31.95	29.28	11.51	31.98	53.78	36.96	15.59	35.04	48.28	33.19	27.28	54.11	48.80	40.79	20.16	23.80
F	17.20	16.32	14.29	16.34	11.55	12.63	1.26	3.41	8.91	16.20	9.98	13.77	12.72	7.42	-21.30	7.81	17.33	16.11	16.08

*A : 12-13 and 13-14 years; B : 13-14 and 14-15 years; C : 14-15 and 15 -16 years; D : 15-16 and 16-17 years; E : 16-17 and 17-18 years ;F :17-18 and 18-19

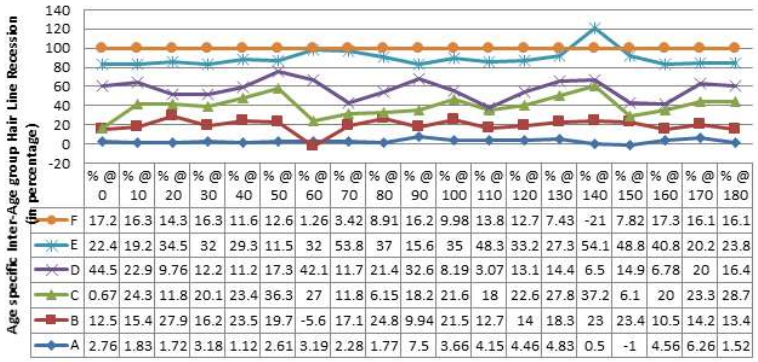

Chart 1: Age group wise percentage of Hair Line Recession

TABLE 2: AGE WISE MAXIMUM RECESSION POINT FOR EACH DEGREE IN PERCENTAGE (%)

Group*	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
A																			
B																			
C		24.28				36.29								27.81				23.29	28.74
D	44.54						42.13			32.56									
E			34.54	31.95	29.28			53.78	36.96		35.04	48.28	33.19		54.11	48.80	40.79		
F																			

(Note : Spaces left blank denote that the recession point for this age-degree combination is not maximum.) ***A : 12-13 and 13-14 years; B : 13-14 and 14-15 years; C : 14-15 and 15 -16 years; D : 15-16 and 16-17 years; E : 16-17 and 17-18 years ;F :17-18 and 18-19***

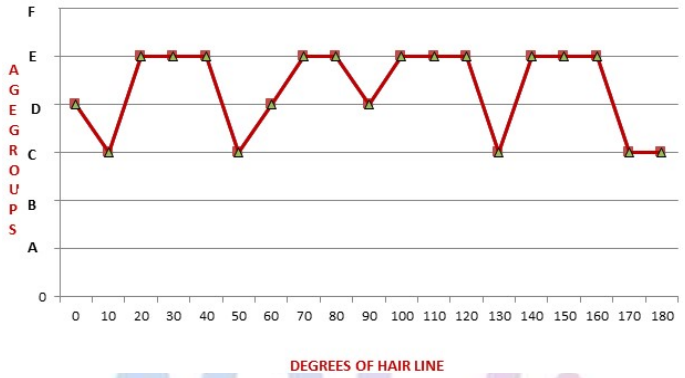

Chart 2: Line Diagram showing percentage of difference of age wise corrected maximum hair line recession at each degree for 'age of onset of hair line recession'

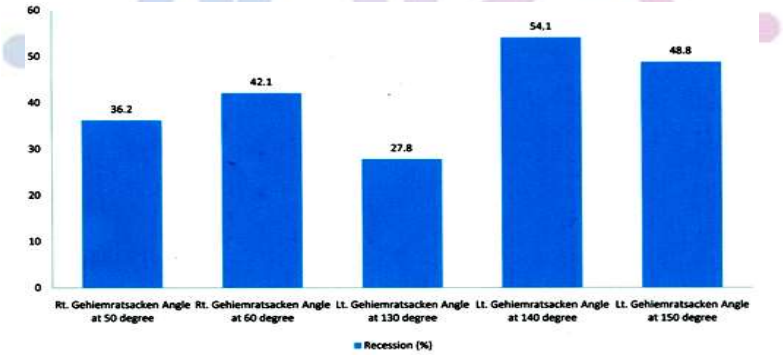

Chart 3: Bar Diagram showing 'Hair Line Recessions' at Right and Left Geheimratsacken Angles. (In Percentage)

*Geheimratsacken Angles are the well developed denundations of the fronto temporal angles on both the sides of hair line.

RESULTS

Corrected hair line recession in age 14-15 year is higher than any other age groups. Four concavities in hair line recession expressed in percentage with uniform status of observed maximum recession for 16-17 and 17-18 years. The Left Gehiemratsacken Angle is deeper and wider than the Right Gehiemratsacken Angle.

DISCUSSION

Male pattern baldness follows a characteristic pattern, with the hair initially receding bilaterally backwards from the frontal-temporal region; in severe cases, regression of the hair line continues, denuding the crown region of the scalp[4,10]. A horse-shoe shaped area of occipital scalp region is consistently spared, suggesting a different end-organ response in these hair follicles to the factor(s) causing baldness in other scalp hair follicles[5]. During puberty, males lose hair in the frontal region in two triangular areas on both sides of the midline, and this gives rise to M shaped hairline, in majority of adult males. This hair pattern requires the presence of male sex hormones.

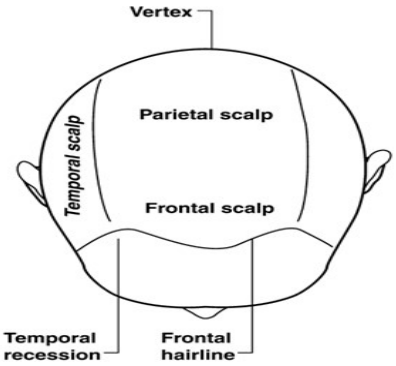

Figure 2:

In this study the Frankfurt's horizontal plane is the standard anatomical landmark for measuring the hairline recession and its pattern. The hairline was measured at every 10 degree angle, from 0 to 180 degree, using geometric compass attached to the frame. Head circumference and chin-occiput circumference were recorded to see the anatomical development of skull with advancing age from 12 to 19 years.

CONCLUSIONS

The hair line pattern shifts down upwards, as measured through Frankfurt Horizontal Plane, for each age as per the degree wise mean measurements of hair line from the glabella. The recession starts at the Right and Left Gehiemratsacken Angles and is observed at more than one degree points; therefore, depicting recession through widening of the angles as the age increases. The highest recession seen at the Left Gehiemratsacken Angle, makes it a marker for identification of the earliest manifested and noticed hair line recession. The most widened recession observed almost along the whole hair line among age group D (age 15-16 years and age 16-17 years) and age group E (age 16-17 years and age 17-18 years) shows that 16 to 18 years of the age observes maximum recession in the adolescents. The impact of growth of head is minimal on the hair line because of the very less value of 'r/2', the half of the radius of mean head circumference. The hair line recession in adolescents noticed despite minor changes in the growth of the skull, especially for the consecutive age groups. 59.89 % recession (11 degree points out of 19 degree points) in the hair line has been observed in the age group E (16-17 years and 17-18 years). Thus from the present study, it appears that the hair line recession starts at 14-15 years of age, rapidly increases as the age advances and becomes highly noticeable during 16-18 years in the adolescents.

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