Hairline shapes: study of a morphogenetic inheritance trait

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Abstract: In human hair, morphology is one of the distinctive trait. The shape of hairline may be curved or straight. It was observed that shape of hairline is morphogenetic trait which is followed by two contrasting alleles; curved or widow's peak (dominant) hairline and straight (recessive) hairline. A familial study was conducted to investigate the inheritance pattern of hairline shapes among randomly selected subjects from Quetta, Pakistan. A total of 1223 subjects from 170 families comprising of 340 parents and 883 offspring were studied. It was observed that the straight hairline was more frequent (64.75%) than widow's peak (35.24%) in general population. Straight hairline was more common in both the genders. Chi square test, contingency table (7X2) revealed ethnic association with hairline shapes. The Results suggested that observation of hair line shapes trait might be suitable for genetic analysis.

INTRODUCTION

A human population has diversity because of numerous morphological and physiological variations among them. Hair morphology is one of the distinctive traits beside skin color and facial features[1]. In 2008 a study was carried out in Nigeria to spread the concept that why do individuals look so different from one another. For this purpose, different physical traits including widow's peak was also selected[2].

Hairline is the line demarcating the hairs of scalp from the forehead. The shape of hairline may be curved or straight, the curved hairline shows a V shaped point descending from mid of head just above forehead also called as Widow's peak (Figures 1 and 2). The two alleles are responsible for controlling the shape of hairline[3]. Widow's peak is dominant character while the straight one is recessive[4]. This trait follows simple dominant- recessive inheritance pattern[5]. The pattern of transmission follows the Mendel's law of inheritance, which assumes that (W) allele is for widow's peak which is dominant while (w) allele is for recessive straight hairline. If an individual expresses the widow's peak hairline shape, the possible genotype is (WW) homogygous or (Ww) heterozygous while one that expresses straight hairline possesses the genotype (ww)[6,7].
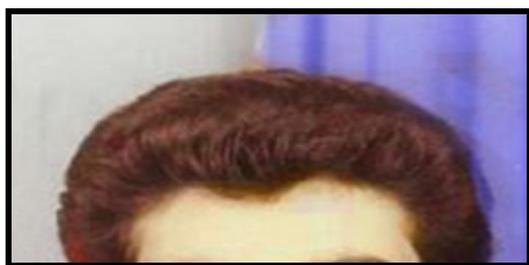
Figure 1: Curved hairline shape (Widow's peak) of a subject.

MATERIALS AND METHODS

A cross-sectional study was conducted in randomly selected subjects from Quetta, Pakistan from April-July 2014. After a well informed consent the shapes of hairline were observed in bright light, magnifying lens was also used when needed to avoid any ambiguity. Data was recorded according to gender, ethnic group, consanguinity, parents and offspring. A total of 1223 subjects were studied. Statistical analysis was done by using statistical package for social sciences (SPSS) version 18.0 for Windows (Chicago, IL. USA). Chi square test; contingency table (7X2) was applied to find out significance of hairline shapes at 5% level of significance.

Figure 2: Straight hairline shape of a subject.

RESULTS AND DISCUSSION

Among 1223 subjects 584 were male and 639 were female. Data of 170 families comprising of 340 parents and 883 offspring were taken (Table 1). The sample population distribution, revealed higher prevalence of straight hairline than widow's peak i.e. 64.75% and 35.25% respectively (Figures 1 and 2). The results showed similarity with the study of Nwaopara *et al.* who observed 57.51% of population possessing straight hairline shape but Nusbaum and Fuentefria claimed dissimilarity with present study;

they reported 81 % widow's peak during their study in women[8,9]. Similar results were observed by Ceballos *et al*., the frontal hairline pattern of widow's peak was 94% in Caucasian women[10]. In this study, the straight hairline was equally common in females (34.18%) and males (30.66%) respectively and widow's peak was found less common in both, males (17.09%) and females (18.07%) respectively. In another study conducted by Ordu and Agi in Nigeria also indicated that straight hairline was more common in females 45.7% than males 40.6%[5].

The difference could be racial in origin, on the same lines, the pattern of hairline shapes were also studied ethnically[10]. Among different prevailing ethnic groups the widow's peak and straight hairline shapes were as; pushtoon (38.82% and 45.33%), baloch (32.49% and 17.36%), punjabi (11.81% and 18.82%), hazara (Persian, 7.8% and 8.01%), urdu speaking (5.49% and 4.81%) saraiki (0% and 2%) (Figure 3). Chi square test; contingency table (7X2) was applied to find out significance of hairline pattern in multi ethnic groups at 5% level of significance. The calculated value was (X^2 (Cal) = 42.64> X^2(tab) =21.026), it indicated that there was an association between the two variables ethnic groups and hairline shapes. To find the strength of association between the two variable (ethnic group and hairline shapes) the coefficient of contingency was used (0≤0.183≤0.70). As the value was closer to 0 it indicated that there was a weak association between the two variables. However, more studies with greater sample size are needed to find out association of hairline shape with ethnicity, gender or etc.

It might appear that application of such studies could be used for human screening either for morphogenetic, behavioral or clinical feature.

ACKNOWLEDGMENT

Table 1: Observed pattern of hairline shapes.

S. No.	Hairline shapes of parents	No. of families	Total number of off- springs	Male offspring		Female offspring	
				Straight Hair line	Widow's peak	Straight Hair line	Widow's peak
1	Father widow's peak and mother straight Hairline	51	257	63(5.15%)	46(3.76%)	82(6.70%)	66(5.39%)
2	Mother widow's peak and father straight Hairline	26	145	44(3.6%)	24(1.96%)	30(2.45%)	45(3.67%)
3	Both parents widow's peak	31	144	17(1.39%)	57(4.66%)	17(1.39%)	53(4.33%)
4	Both parents straight Hair line	62	337	161(13.16%)	-	176(14.39%)	-
	Total	170	883	287(23.46%)	127(10.38%)	305(24.93%)	164(13.41%)
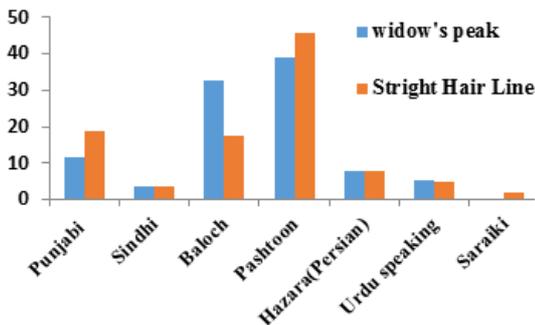
Figure 2: Patterns of hairline shapes among ethnic groups.

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