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Human Population Genetics I. A Preliminary Study of Some Morphological and Genetic Traits in Varanasi, Uttar Pradesh

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ABSTRACT A random sample of 500 subjects from Varanasi was studied to obtain the frequency distribution of four morphological and genetical traits *viz.*, widow's peak, attached ear lobe, dimple in chin and PTC tasting ability.

INTRODUCTION

Study of the mechanism by which the genetic changes are affected in a population constitutes the field of population genetics and it concerns both, investigations on the origin of genetic diversity (due to mutation and chromosomal variability) and investigations on the spread of genetic diversity (due to selection, drift and migration). Thus population genetics is an important field of investigation. Population genetics of various animal and plant species has been investigated in detail. Studies in human population genetics have also been undertaken by several investigators and important information concerning mutation, selection, drift, inbreeding, protein polymorphism and association between genetic markers and diseases in different regions of the world have been obtained (for references see Morris, 1973 ; Bhasin et al. 1992, Bhasin, 1994). A number of studies on the distribution of genetical, morphological and behavioural traits among the peoples of the Indian region have been reported (see Bhasin et al., 1992). During the present study, the distribution of four morphological and genetic traits namely widow's peak, attached ear lobe, dimple in chin and PTC tasting ability was investigated in a random sample of 500 subjects both females and males inhabiting the Varanasi city of Uttar Pradesh.

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SUBJECTS AND METHODS

Subjects belonging to different departments (including Mahila Maha Vidyalaya) of Banaras Hindu University and various residential colonies of Varanasi city were studied.

PTC Tasting : PTC paper (0.05 per cent phenyl thiocarbamide) was used for scoring the taster and non-taster. Ability to taste phenyl thiocarbamide also known as phenyl thiourea is a genetic trait. Some persons detect a bitter taste from this chemical (the bitter taste is due to the presence of NC=S group in the molecule). Individuals were classified into two groups: tasters - ability to taste the chemical is controlled by the dominant allele*T* and these tasters include both the genotypes *TT* and *Tt* ; and non-tasters - who are homozygous for recessive allele *t*.

Widow's Peak : The front line of hair projects down in the middle of forehead and it is inherited as an autosomal dominant character. Individuals were classified into two groups : widow's peak hair line (homozygous *WW* or heterozygous *Ww*) and a smooth hairline (homozygous for the recessive gene *w*).

Ear Lobe Attachment : Ear lobes may be free or attached. Free ear lobe is controlled by a dominant gene *A* and attached ear lobe by a recessive gene *a*. Individuals with free ear lobe amay be homozygous (*AA*) or heterozygous (*Aa*). All the subjects were classi-

fied into two groups : Free ear lobes and attached ear lobes.

Dimple in Chin : Depression of dimple in the lower part of the chin is inherited as an autosomal dominant character. The genotype of individuals showing dimple in chim may be homozygous (*DD*) or heterozygous (*Dd*). Individuals with smooth chin are homozygous for recessive gene (*dd*). Number of individuals with or without dimple in chin was scored.

For all the four characters, data of phenotypic classes were obtained for both sexes separately.

RESULTS AND DISCUSSION

Table 1 shows different phenotypic classes and gene frequencies of the four systems investigated here in a random sample of Varanasi city. Frequency of individuals showing widow's peak is less than those showing smooth hair line and correspondingly the frequency of *W* gene is also very low in Varanasi population. Interestingly, the frequency of Widow's peak phenotype and *W* gene is higher in females than males. As far as we know, this character has been studied for the first time for frequency distribution in Indian populations and no data are available for comparison. A more or less similar trend has been observed for dimple in chin in Varanasi population and for that trait also, no previous data are available for comparison.

From the data on PTC tasting, it is evident that tasters are more frequent than non-tasters in both sexes in Varanasi population. However, the frequency of *t* allele is higher than that of *T* allele in both sexes. The frequency of tasters varies from 46 to 75 per cent in Indian populations including tribals (Niyogi and Srivastava, 1986). In the persent sample from Varanasi, the frequency of tasters is 67.8 per cent which is well within the range of variation for Indian populations. Further, the frequency of tasters is higher in females (71.1 per cent) than males (56.9 per cent) in Varanasi population. Deb and Shukla (1981) reported data on PTC tasting in different castes of Varanasi. The frequency of tasters in males varied from 69 to 72 per cent and in females form 71 to 75 per cent. Our data for females are close to that of Deb and Shukla (1981) but for males there is comparatively lower incidence of tasters in the present stydy. We have found that the frequency of *T* allele is lower than that of *t* allele in Varanasi population. A similar trend was seen in the data reported by Deb and Shukla (1981). However, in certain Uttar Pradesh populations the frequency of *T* allele is reported very high (73.3 per cent in Uttar Kashi; Tiwari and Kapoor, 1984).

We also studied the attached ear lobe phe-

Table 1 : Distribution of various genetic traits in Varanasi population

Population	*Widow's peak*		*PTC tasting*		*Attached ear lobe*		*Dimple in chin*	
	Widow's peak	*Straight hair line*	*Tasters*	*Non -tasters*	*Attached ear lobe*	*Free ear lobe*	*Dimple in chin*	*Smooth chin*
Phenotypes								
Males (n=116)	15(12.9)	101	66(56.9)	50	38(32.8)	78	14(12.1)	102
Females (n=384)	135(35.2)	249	273(71.1)	111	101(26.3)	283	94(24.5)	290
Combined (n=500)	150(30.0)	350	339(67.8)	161	139(27.8)	361	108(21.6)	392
Allele Frequencies	*W*	*w*	*T*	*t*	*a*	*A*	*D*	*d*
Males	0.067	0.933	0.343	0.657	0.572	0.428	0.062	0.938
Females	0.195	0.805	0.462	0.538	0.513	0.487	0.131	0.869
Combined	0.163	0.837	0.433	0.567	0.527	0.473	0.115	0.885

Values given in parentheses are percentages.

notype in Varanasi population and found that its frequency is low as compared to free ear lobe phenotype in both sexes. However, the frequency of *a* allele (controlling attached ear lobe phenotype) is higher than that of *A* allele in the sample studied.

In various regions of Uttar Pradesh, the frequency of attached ear lobe phenotype has been reported by different invertigators (Bhowmick, 1971 ; Tyagi and Gupta, 1973 ; Garg, 1979 ; Kapoor, 1982). The range of variation in the frequency of aa individuals is from 7.8 per cent (Muslim males of Lucknow, Bhowmick, 1971) to 60 per cent (Bhoksa males of Dehradun, Garg, 1979). Thus our data of Varanasi population come within this range of variation for Uttar Pradesh.

Thus it may be concluded that the distribution of PTC tasting and attached ear lobe phenotypes in a random sample of Varanasi city is more or less similar to the earlier data for different populations of north Indian region. The data for widow's peak and dimple in chin are reported here for the first time.

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