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GENETIC VARIABILITY AND CORRELATION AMONG VARIOUS MORPHOLOGICAL TRAITS IN STUDENTS OF UAF, PUNJAB PAKISTAN

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ABSTRACT

Genetic variation particularly in various human morphological traits is due to deviation of Hardy Weinberg equilibrium. The study was conducted by students of Plant Breeding and Genetics in University of Agriculture, Faisalabad. Data was taken from the various classes of UAF by questionaires. It was suggested that most of the students have heterozygous alleles for controlling free ear lobe, middle digital hair and tongue rolling. It was indicated that the right hand clasp was controlled by recessive genes and left by dominant genes and most of the students are with right hand clasping. The trait widow's peak was found to be V-shaped in the entire population and was controlled by dominant and heterozygous alleles. Positive correlation indicated that the individual with free ear lobe showed was affected by right hand clasping and negatively by V-shaped widow's peak. Hand clasping was significantly and positively correlated with middle digital hair, V-shaped widow's peak and tongue rolling. It was suggested that middle digital hair, V-shaped widow's peak and tongue rolling may be transferred from generation to generation in Pakistan for males, females and combined (males and females). The positive correlation among traits indicated that the continuity of traits transfer may be prolonged in human generation as various morphological traits.

INTRODUCTION

About 400 blood groups have been reported among of them ABO blood group is on first position while the Rh blood group is on 4th number and are useful for genetic markers [1]. Both type of blood group are more important for medical point of view due to their critical role in transfusion and have somewhat association with certain diseases e.g. preponderance of stomach cancer among peoples of A blood group and also more susceptibility to malaria [2]. Individual genotype and blood group has variation in all around the world's population. ABO blood group was discovered by Landsteiner in 1900 and its gene is located on long arm of chromosome no. ninth while Rh factor on chromosome number one. The different morphological characters can be used to determine the heredity variation among the human population, while the Fluctuations in different phenotypic traits are due to plethora of factors and these factors may not follow the Hardy Weinberg law [3]. Hand clasping is genetically controlled trait and the substantial right hand clasping was reported in females as compared to males [4]. In tongue rolling dominant gene is responsible for rolling while recessive gene associated with inability. The present study has been conducted to find out the variation among different morphogenetically controlled traits such as ear lobee, mid digital hair, hand clasping, widow peak and tongue rolling. Correlation coefficients were computed to study the traits association.

MATERIAL AND METHODS

The study of qualitative traits was carried out by the students of University of Agriculture, Faisalabad

Punjab, Pakistan. There are variety of student belongs to various districts of Punjab. A Performa of qualitative traits were prepared and met to individual students in their hostels. There are about 50% students belongs to south Punjab and remaining student are from North and middle Punjab. There are 50 students are selected from each hostel randomly and data was recorded. The study was done by the permission from the Chairman, Department of Plant Breeding and Genetics. The data for quantitative traits from girls was recorded in various classes. Ten girls were chosen randomly from each class and Performa was filled by given them some instructions. The data was recorded for ear lobee, mid digital hair, hand clasping, widow peak and tongue rolling from 137 male students and 63 female students. The Hardy-Weinberg model provides the opportunity by using mathematical relationship to predict the frequency of various genotypes and alleles. The data was statistically analyzed by using analysis of variance technique [5]. The correlation coefficients were calculated by Kwon and Torrie [6] technique.

RESULTS AND DISCUSSION

It was persuaded from tables 1, 2, and 3 that higher frequency was reported for heterozygotes (Aa) for free ear lobe for all male, female and combined frequency of genotypes. It was indicated that most of the students have heterozygous alleles for controlling free ear lobe. The percentage of heterozygous alleles was also higher for free ear lobe. Higher frequency of right hand clasping was recorded for all male, female and combined frequencies of genotypes. The frequency of alleles for various traits varies from generation to generation [7]. The allele frequency and percentage was also found higher. It indicated that the right hand clasp is controlled by recessive genes and left by dominant genes and most of the students are with right hand clasping. It was found that the middle digital hair were controlled by dominant genes while under study students showed higher frequency for recessive gene that showed absence of hair on middle digits. The allele frequency and percentage was higher for no middle digital hair. It was suggested that no or with middle digital hair was found frequently in population. The trait widow's peak was found to be V-shaped in the entire population and was controlled by dominant and heterozygous alleles. The percentage and frequency of heterozygous alleles was higher in population. Flat widow's peak was controlled by recessive genes.

Most of the students showed V-shaped widow's peak and it may be transferred in next generations. Similar results were reported by Sturtevant [8]. It was persuaded from results that tongue rolling was controlled by dominant genes and most of the students in UAF showed dominant effects with heterozygous allelic effects. The frequency and percentage of dominant alleles in population was higher as compared with recessive alleles. It was concluded that tongue rolling in the population is discrete type of traits. The traits in the population transferred from generation to generation frequently in higher frequency of genotypes. It was suggested from tables 1a, 2a and 3a that free ear lobe was negatively and significantly correlated with hand clasping while positively and significantly correlated with widow's peak for males, females and combined (males and females). Positive correlation indicated that the individual with free ear lobe showed was affected by right hand clasping and negatively by V-shaped widow's peak.

It was reported that the free ear lobe and V-shaped widow's peak may transferred from generation to generation while right hand clasping may be continuously varied from generation to generation in Pakistan. Hand clasping was significantly and positively correlated with middle digital hair, V-shaped widow's peak and tongue rolling. It was suggested that middle digital hair, V-shaped widow's peak and tongue rolling may be transferred from generation to generation in Pakistan for males, females and combined (males and females). The positive correlation among traits indicated that the continuity of traits transfer may be prolonged in human generation as various morphological traits were studied earlier.

Table 1. Frequency of Alleles and individuals for males

Frequency of genotypes					
	Ear Lobe	**Hand Clasping**	**Middle Digital Hair**	**Widow's Peak**	**Tongue Rolling**
AA	49.32	5.48	12.33	21.92	12.33
Aa	65.76	43.84	57.54	65.76	57.54
aa	21.92	87.68	67.13	49.32	67.13
Frequency of alleles					
p	0.6	0.2	0.3	0.4	0.3
q	0.4	0.8	0.7	0.6	0.7
Percentage of alleles %					
AA	36	4	9	16	9
Aa	48	32	42	48	42
aa	16	64	49	36	49

Table 1a. Correlation among morphological traits for males

Traits	Ear Lobe	Hand Clasping	Middle Digital Hair	Widow's Peak
Hand Clasping	-0.6484*			
Middle Digital Hair	-0.3031	0.922*		
Widow's Peak	0.2347	0.5879*	0.8552*	
Tongue Rolling	-0.3031	0.922*	1.00*	0.8552*

* = Significant at 1% probability level

Table 2. Frequency of Alleles and individuals for females

Frequency of genotypes					
	Ear Lobe	**Hand Clasping**	**MiddleDigital Hair**	**Widow's Peak**	**Tongue Rolling**
AA	22.68	2.52	5.67	10.08	5.67
Aa	30.24	20.16	26.46	30.24	26.46
aa	10.08	40.32	30.87	22.68	30.87
Frequency of alleles					
p	0.6	0.2	0.3	0.4	0.3
q	0.4	0.8	0.7	0.6	0.7
Percentage of alleles %					
AA	36	4	9	16	9
Aa	48	32	42	48	42
aa	16	64	49	36	49

Table 2a. Correlation among morphological traits for females

Traits	Ear Lobe	Hand Clasping	Middle Digital Hair	Tongue Rolling
Hand Clasping	-0.4013*			
Middle Digital Hair	-0.0535	0.9254*		
Tongue Rolling	-0.0535	0.9254*	1.00*	
Widow's Peak	0.4169*	0.632*	0.8776*	0.8776*

* = Significant at 1% probability level

Table 3. Frequency of Alleles and individuals for combined males and females

Frequency of genotypes					
	Ear Lobe	**Hand Clasping**	**Middle Digital Hair**	**Widow's Peak**	**Tongue Rolling**
AA	72	8	18	32	18
Aa	96	64	84	96	84
aa	32	128	98	72	98
Frequency of alleles					
p	0.84	0.36	0.51	0.64	0.51
q	0.16	0.64	0.49	0.36	0.49
Percentage of Alleles %					
AA	36	4	9	16	9
Aa	48	32	42	48	42
aa	16	64	49	36	49

Table 3a. Correlation among morphological traits for combined males and females

Traits	Ear Lobe	Hand Clasping	Middle Digital Hair	Tongue Rolling
Hand Clasping	-0.4685*			
Middle Digital Hair	-0.1199	0.9243*		
Tongue Rolling	-0.1199	0.9243*	1.00*	
Widow's Peak	0.3703*	0.6194*	0.8714*	0.8714*

CONCLUSION

It was concluded that hand clasping was significantly and positively correlated with middle digital hair, V-shaped widow's peak and tongue rolling. It was suggested that middle digital hair, V-shaped widow's peak and tongue rolling may be transferred from generation to generation in Pakistan for males, females and combined (males and females). The positive correlation among traits indicated that the continuity of traits transfer may be prolonged in human generation as various morphological traits.

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