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THE GENE SERUM GROUP FREQUENCIES IN THE POPULATION OF EAST SLOVAKIA

ABSTRACT: The gene frequencies of serum groups — haptoglobin, Inv and Gc factor — were analyzed in the population of East Slovakia. The following gene frequencies were found: $Hp^1 = 0,3316$, $Hp^2 = 0,6684$, $Inv^1 = 0,0399$, $Inv^2 = 0,9601$, $Gc^1 = 0,6766$, $Gc^2 = 0,3234$.

The results obtained were compared with values from reports of Herzog (1992) in inhabitants of Prague and of Bambúchová (1985) in Bratislava population.

KEY WORDS: Serum group — Gene frequencies — East Slovakia.

More than 100 mostly polymorphic protein groups are detectable in plasma. They can be separated by electrophoresis running on gel carrier (starch, acrylamide, agarose) and visualized by subsequent staining. These electrophoretic methods used in assessing the protein heterogeneity have been introduced by Smithies (1955), and it was Smithies who found the haptoglobin heterogeneity using starch electrophoresis. Some further proteins analyzed in a similar manner were also found to exhibit genetic polymorphism underlying their heterogeneity.

However, the genetic polymorphism alone seems not to be equally important since sometimes even only a minimal alteration in the protein structure can change its function while sometimes it cannot (Hrubíšková and Dobrý, 1974).

Considering genetic polymorphism detectable by immunological or physical and chemical methods, the blood serum proteins as well as for example red blood cell enzymes, can be divided into several group systems with one, two or more alleles.

The regional analysis of group systems is of importance for genetic and anthropological research regarding the different proportion of some allotypes

and alleles in individual nations and races, too (Bernasovský 1987).

MATERIAL AND METHODS

The sera of voluntary blood donors from East Slovakia were surveyed for the following groups — haptoglobin, Inv and Gc factor. Blood samples from their relatives and the Rom ethnic group were not included into the set examined.

Serum haptoglobin typing was carried out using horizontal starch gel electrophoresis described by Smithies (1955), Inv group by the test of inhibition of agglutination in tubes and Gc factor according to Hirschfeld (1960).

The gene frequencies were calculated according to Moutant et al. (1976).

The phenotype frequencies observed were compared with expected ones by χ^2 test. In all systems followed, they corresponded to expected ones under Hardy-Weinberg law.

RESULTS AND DISCUSSION

The gene frequencies of chosen serum group systems in East Slovakian population and their comparison with those in inhabitants of Prague (Herzog 1992) and of Bratislava (Bambúchová 1985) are given in Table 1.

TABLE 1. The gene frequencies of serum group systems in East Slovakian population and their comparison with inhabitants of Prague and Bratislava.

System	Population		
Hp	East Slovakia N=4107	Prague N=918	Bratislava N=1278
Hp ¹	0.3316	Herzog (1992) 0.4129	Bambúchová (1985) 0.3646
Hp ²	0.6684	0.5871	0.6354
		$\chi^2(1) = 2.72^*$	$\chi^2(1) = 0.47$
Gc	N=2458	N=560	N=1259
Gc ¹	0.6766	0.5813	0.6726
Gc ²	0.3234	0.4187	0.3274
		$\chi^2(1) = 3.73^*$	$\chi^2(1) = 0.17$
Inv	N=4181		N=1259
Inv ¹	0.0399		0.0439
Inv ²	0.9601		0.9561
			$\chi^2(1) = 2.02$

* (P < 0.05)

The haptoglobin, serum glycoprotein binding stoichiometrically the free haemoglobin, was described already in the late 1930s by Polonovski and Jayle (1938). Its synthesis and genetically determined polymorphism in humans have been gradually elucidated as a result of introduction of starch gel electrophoresis by Smithies (1955). Smithies and Walker (1955) suggested that the haptoglobin polymorphism is controlled by two autosomal genes, the Hp¹ and Hp².

Seroanthropological study of haptoglobins in European populations (Mourant et al. 1976) showed that the frequency of the Hp¹ gene is about 41 % with a tendency towards decreasing from the north to the south.

Within the Czech and Slovak Republics, there is a tendency towards decreasing from the west to the east as documented by 41 % in Prague (Herzog 1992), 36 % in Bratislava (Bambúchová 1985) and 33 % in East Slovakia.

Serum Inv system was the second group system of immunoglobulins followed. Of importance namely for geneticists and anthropologists is its examination since the different allotype proportion is characteristic of individual populations, races and diseases as well.

Unfortunately, there were no data from Prague available to compare. Therefore, the frequency of the

Inv¹ gene could be compared only with the data from Bratislava (Bambúchová 1985). However, no significant differences were found between them.

On the other hand, significant differences were found in the frequency of the Gc¹ gene, being higher in our set as compared to Prague population (Herzog 1992).

In general the Gc group varies only a little in populations and its variants appear very rarely. Gc¹ and Gc² alleles are inherited dominantly and usually do not show any anomalies.

CONCLUSIONS

Our report informs about the gene frequencies of serum groups in the East-Slovakian population. Comparing the results within the Czech and Slovak Republics (Prague, Bratislava, East Slovakia), there was the decreasing frequency of the Hp¹ gene eastwards, and a higher proportion of the Gc¹ gene in East Slovakia compared to Prague data.

The gene frequencies calculated can be useful in determining the gene distances, the tables of Essen-Möller-Geyger critical probability values for paternity expertises as well as in completing the seroanthropological studies in this region.

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