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THE GENE BLOOD GROUP FREQUENCIES IN THE POPULATION OF EAST SLOVAKIA

ABSTRACT: *The present paper informs about ABO, Rh, MN, P, Duffy, Lutheran, Lewis, Kell and Kidd blood group frequencies in the population of East Slovakia. The following gene frequencies were found: ABO system — $p_1(A_1) = 0,2017$, $p_2(A_2) = 0,0648$, $q(B) = 0,1825$, $r(O) = 0,5510$. Rh system — $cde = 0,3971$, $cDe = 0,0171$, $CDe = 0,4869$, $cDE = 0,0989$. MN system — $m = 0,6680$, $n = 0,3320$. P system — $P = 0,5898$, $p = 0,4102$. Duffy system — $Fy^a = 0,4604$, $Fy^b = 0,5396$. Lutheran system — $Lu^a = 0,0859$, $Lu^b = 0,9141$. Lewis system — $Le^a = 0,2387$, $Le^b = 0,7613$. Kell system — $K = 0,0321$, $k = 0,9679$. Kidd system — $Jk^a = 0,5783$, $Jk^b = 0,4217$. The gene frequencies obtained were compared with those in inhabitants of Prague (Herzog 1992) and Bratislava (Bambúchová 1985).*

KEY WORDS: *Blood group — Gene frequencies — East Slovakia.*

In the anthropological, genetic and clinical research, the study of blood groups in healthy population becomes of growing importance and larger numbers of scientists are concerned with this field. Among the anthropological studies, most important in the Czech and Slovak Republics are the works of Matiegka (1927), Suk (1932), Škaloud (1934), Raška (1948), Valníček (1953), Dokládál (1954), Kout (1958), Vlček (1962). The authors initially dealt with ABO and later with Rh system.

Gradually, as further blood group systems were discovered there were more works dealing with their proportion in the Czech and Slovak Republics, such as Kout (1959), Hrubíško (1958), Šmálik (1965), Vacl et al. (1970), Ferák (1971), Kušíková (1975) and Bernasovský et al. (1976).

To make a comparison with the results obtained within the seroanthropological study of Rom population, we have determined the blood and serum groups, erythrocyte isoenzymes as well as HLA system frequencies in East Slovakian non-Rom popu-

lation. In this paper we report upon the gene frequencies of blood group systems ABO, Rh, MN, P, Duffy, Lutheran, Lewis, Kell and Kidd. Though a lot of questions remain to be answered, our study could contribute to understanding the problematics in East Slovakian region.

MATERIAL AND METHODS

The set examined comprises voluntary blood donors from East Slovakia. Neither their relatives, nor the Rom ethnic group were included in the set examined.

Blood groups were determined by test-tube method according to instructions attached to diagnostic sera. Complete diagnostic sera were used to determine the ABO, Rh, MN, P, Kell and Lewis blood group systems, while with incomplete diagnostic sera (with the use of Coombs serum) the Lutheran, Duffy and Kidd systems were determined. Standard dia-

TABLE 1. Comparison of the gene frequencies of blood group systems ABO, Rh, MN, P and Duffy in population of East Slovakia with the data from Prague and Bratislava.

System	Population		
A B O	East Slovakia N = 1466	Prague N = 2298 Herzog (1992)	Bratislava N = 1295 Bambúchová (1985)
A ₁	0.2017	0.2042	0.2247
A ₂	0.0648	0.0702	0.0463
B	0.1825	0.1574	0.1600
O	0.5510	0.5682	0.5690
		$\chi^2(3) = 0.66$	$\chi^2(3) = 1.39$
Rh	N = 1638		Bratislava N = 1491 Ferák (1971)
CDE	—		0.0040
CDe	0.4869		0.4191
Cde	—		0.0292
cDE	0.0989		0.1204
cDe	0.0171		0.0225
cdE	—		0.0045
cde	0.3971		0.4003
		$\chi^2(2) = 2.72$	
M N	N = 1455	Prague N = 1186 Herzog (1992)	Bratislava N = 1271 Bambúchová (1985)
m	0.6680	0.5489	0.5775
n	0.3320	0.4511	0.4225
		$\chi^2(1) = 5.73^{xx}$	$\chi^2(1) = 3.36^x$
P	N = 1937	N = 891	N = 1153
P	0.5898	0.5995	0.5680
p	0.4102	0.4005	0.4320
		$\chi^2(1) = 0.07$	$\chi^2(1) = 0.32$
Duffy	N = 1596	N = 500	N = 1150
Fy ^a	0.4604	0.4396	0.4504
Fy ^b	0.5396	0.5604	0.5496
		$\chi^2(1) = 0.18$	$\chi^2(1) = 0.04$

gnostic sera were supplied by FHTO Košice, ÚSOL Prague, Immuno Diagnostica Vienna, Biotest Frankfurt, Immunocor Rodermark.

The gene and haplotype frequencies were calculated according to Mourant et al. (1976). The phenotype frequencies found were compared with expected ones by χ^2 test. In all systems followed, the frequencies found correspond to expected ones under Hardy-Weinberg law. All calculated gene frequencies were compared with the data from Prague (Herzog 1992) and Bratislava (Bambúchová 1985) except for the Rh system, where only data from Bratislava (Ferák 1971) were available.

RESULTS AND DISCUSSION

The distribution of phenotype and genotype frequencies in the population of East Slovakia and their

TABLE 2. Comparison of the gene frequencies of blood group systems Lutheran, Lewis, Kell and Kidd in population of East Slovakia with the data from Prague and Bratislava.

System	Population		
Lutheran	East Slovakia N = 2707	Prague N = 985 Herzog (1992)	Bratislava N = 8 Bambúchová (1985)
Lu ^a	0.0859	0.0284	0.0625
Lu ^b	0.9141	0.9716	0.9375
		$\chi^2(1) = 6.80^{xx}$	$\chi^2(1) = 0.93$
Lewis	N = 1229	N = 200	N = 155
Le ^a	0.2387	0.2665	0.2665
Le ^b	0.7613	0.7335	0.7335
		$\chi^2(1) = 0.60$	$\chi^2(1) = 0.40$
Kell	N = 4463	N = 510	N = 1153
K	0.0321	0.0462	0.0433
k	0.9679	0.9538	0.9567
		$\chi^2(1) = 0.64$	$\chi^2(1) = 0.41$
Kidd	N = 2320	N = 675	N = 147
Jk ^a	0.5783	0.5247	0.4490
Jk ^b	0.4217	0.4753	0.5510
		$\chi^2(1) = 1.21$	$\chi^2(1) = 6.76^{xx}$

^x ($p < 0.05$) ^{xx} ($p < 0.01$)

comparison with the data obtained in Prague and Bratislava inhabitants are given in Tables 1 and 2.

In the ABO blood group system, there was a difference in the q gene (B) frequency in our set, being higher than in Prague and Bratislava sets. This is in good agreement with the European regional drift of the B blood group eastward.

In the Rh blood group system, our results were compared only with those obtained from inhabitants of Bratislava (Ferák 1971). A higher frequency in haplotype CDe was found in our set.

The MN blood group system evaluated in the same manner as the above systems, showed the statistically significant higher occurrence of the m gene in our set.

In the P system, no differences in gene frequencies were seen between the sets compared.

In the Duffy system, an increased Fy^a gene frequency was observed in our set. Increasing frequency of this gene towards the East had also been reported by Kušíková (1975).

Comparing the Lutheran system significant differences of the gene Lu^a were found in our study.

No marked differences of gene frequencies were found in the Lewis blood group system.

A higher proportion of genes k and Jk^a was noticed in the Kell and Kidd systems, respectively.

CONCLUSIONS

Our study reports upon the gene frequencies of the 9 blood group systems in East Slovakian popu-

lation. Comparing our results with those from Prague and Bratislava, an eastward tendency towards increasing the frequencies of the gene q (ABO), the gene m (MN), the gene Jk^a (Kidd) and the gene Fy^a (Duffy) can be observed.

The gene frequencies calculated by us can be useful in determining the gene distances, the tables of Essen-Möller-Geyger critical probability values for paternity expertises, in transfusion services and further anthropological studies as well.

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