

RESEARCH REGARDING THE FREQUENCY OF AB0 BLOOD GROUPS IN A POPULATION OF PUPILS FROM RĂUCEȘTI, NEAMȚ COUNTY

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Received: 01 June 2016 / Revised: 03 June 2016 / Accepted: 27 June 2016 / Published: 13 July 2016

Key words: AB0 blood groups, frequency, population genetics.

Abstract: We have studied the frequency of AB0 blood groups in Răucești, Neamț County, as part of a larger study regarding the genetic polymorphisms present in the human population of Romania and particularly in Neamț county. The blood groups frequency were: O = 34.86; A = 42.91; B = 15.88; AB = 6.34. As controls were used data obtained from Blood Transfusion Centre from Neamț county, determination made between 2010-2013. These values are in accordance with the values registered for all Romanian population and particularly in Neamț county: in Roman town between 2001-2004, and in Piatra Neamț for 2008-2009 the frequency of blood groups are also, in accordance with our results. The blood groups O, A and AB are more frequent in females, and B is more frequent in males.

INTRODUCTION

AB0 blood groups, due to their monogenic determinism, are ones of the most studied pure inherited traits. AB0 blood groups are fulfilling all the criteria for the optimal genetic study: high frequency, easy to be determined and statistically analysed (Tudose et al., 2000).

It is still a question if Mendel's laws, discovered and formulated on pea, with validity proved at the beginning of XX-th century also for animals including human beings, are universal. For *Homo sapiens sapiens*, because of ethical and moral reasons, it can not be done controlled cross experiments and consanguinisations, offspring is reduced as number for each genitor pair, carrier of any genetic maladies can not be excluded from reproduction, this limitations making investigations more difficult comparing to those regarding plants, animals or microorganisms, leading to specific working methods (populational studies, mono- and dizygote twins investigations).

Part of a larger study regarding the genetic polymorphisms present in the human population of Romania, followed in the future by the elaboration of a map illustrating the situation of AB0 system blood groups frequency for the whole country, we have continued to study the frequency and transmission of AB0 blood groups in a scholar population at regional level: Neamț County.

Our researches started in Neamț County in Roman in 2001-2004 (Băra et al., 2007) continued in Piatra Neamț for 2008-2009 (Băra and Greșanu, 2010) and are directed on: processing data for 117 pupils from School Nr.1, Răucești, Neamț County, processing data regarding AB0 blood groups, determined at Blood Transfusion Center Piatra Neamț between 2010-2013 and comparing them with those obtained for Roman in 2001-2004 (Băra et al., 2007) and Piatra Neamț for 2008-2009 (Băra and Greșanu, 2010). From the investigated group, we obtained data regarding AB0 system blood groups frequency for scholar population and for the two sexes.

MATERIALS AND METHODS

The data, regarding blood groups, were obtained from 117 pupils, 53 boys and 64 girls, born between 1999-2002, registered in scholar year 2012-2013 at School Nr.1, Răucești, as it follows: 7 fellows in the 5th class, 28 in the 6th class, 37 in the 7th class, 45 in the 8th class. Data were processed based on a filled out printed form, regarding the blood groups of them and of their families members (parents, brothers or sisters, grandparents), were grouped in 4 files, base on year of birth (1999-2000-2001-2002), and then reported to recorded data from Blood Transfusions Center (CTS) Piatra Neamț, for 2010-2013. Based on this, it was possible to elaborate 15 pedigrees, using the international symbols.

RESULTS AND DISCUSSIONS

In Romania, for AB0 blood groups, the repartition is: O Group= 34%; A Group= 41%; B Group= 19%; AB Group= 6% (Băra et al., 2007).

For Neamț County, Roman region, Băra et al, 2007, noticed the next mean frequency repartition: 0 Group= 33%; A Group= 43%; B Group= 16%; AB Group= 8%, and for Piatra Neamț region, for 2008-2009, noticed the mean frequency was: 0 Group = 31%; A Group = 44%, Group B = 16%, Group AB = 9% (Băra & Greșanu, 2010).

Table 1. Frequency of the AB0 blood groups at CTS Piatra Neamț between 2010 and 2013

Blood Group	2010(%)	2011(%)	2012(%)	2013(%)	Average (%)
0	36.69	35.41	34.37	32.99	34.86
A	43.31	42.32	42.54	43.47	42.91
B	14.76	15.81	16.54	16.42	15.88
AB	5.24	6.46	6.55	7.12	6.34

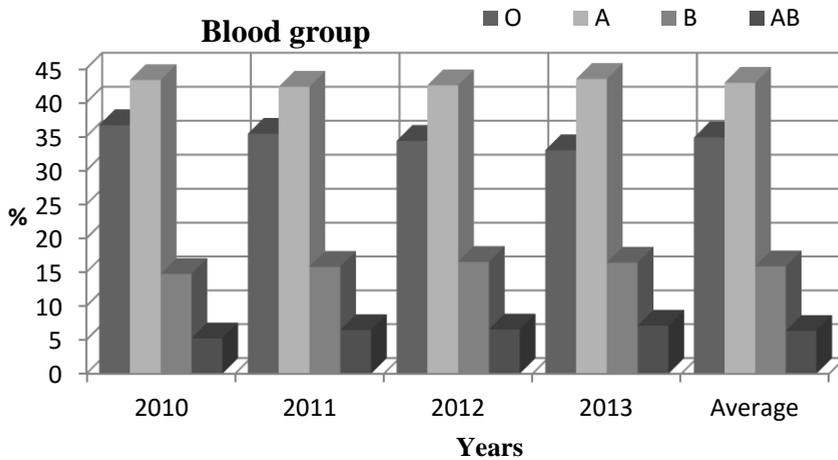


Figure 1. Frequency of the AB0 blood groups at CTS Piatra Neamț between 2010 and 2013

Data from Blood Transfusions Center (CTS) Piatra Neamț, for 2010-2013 show a mean frequency repartition of 0 Group = 35%; A Group = 43%, Group B = 16%, Group AB = 6%, very similar comparing with previous data (for 2008-2009) in Piatra Neamț.

Table 2. Average frequency of the AB0 blood groups at CTS Piatra Neamț between 2008-2009 (Băra & Greșanu, 2010) and 2010-2013 (this study), and 2001-2004 at CTS Roman (Băra et al, 2007)

Blood Group	Average (%) 2001-2004 Băra et al, 2007	Average (%) 2008-2009 Băra & Greșanu, 2010	Average (%) 2010-2013 This study
0	33	31	35
A	43	44	43
B	16	16	16

AB	8	8	6
Total	100	100	100

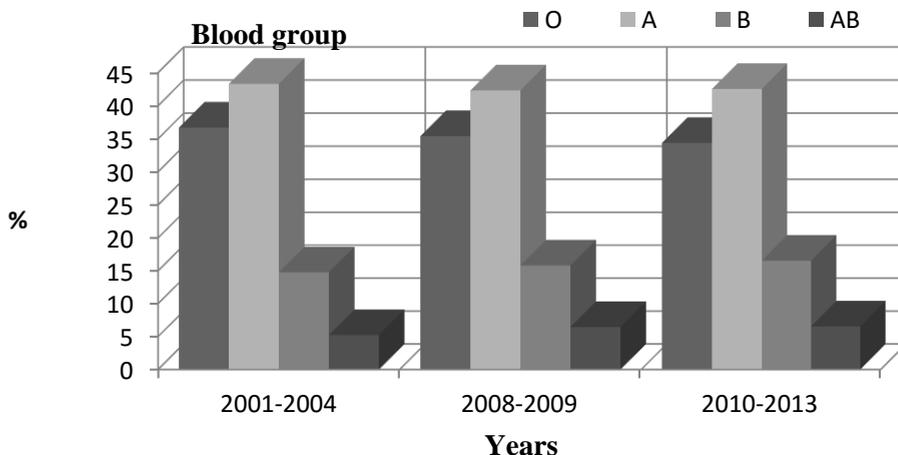


Figure 2. Average frequency of the AB0 blood groups in Neamț County, for this study data for 2010-2013, compared with data for 2008-2009 (Băra & Greșanu, 2010) and data for 2001-2004 (Băra *et al.*, 2007).

Comparing this data with AB0 blood system frequency at the level of whole country, it can be concluded that, for Piatra Neamț, blood groups frequency in normal limits, characteristic for Romanian population, and very similar to results showed by Băra & Greșanu, 2010, and Băra *et al.*, 2007, for Neamț County after a similar study made in Roman.

THE FREQUENCY OF AB0 BLOOD GROUP SYSTEM, IN THE INVESTIGATED SCHOLAR POPULATION

As shown in table 3, from the total of 117 investigated pupils (53 boys and 64 girls), from School Nr.1, Răucești, Neamț County, 39 (15 boys and 24 girls) belonged to O blood group (33.33%), 49 (22 boys and 27 girls) to A blood group (41.88%), 22 (13 boys and 9 girls) to B group (18.80%) and 7 (3 boys and 4 girls) to AB group (5.98%). The percentage is shown in Figure 3.

Table3. Distribution of the AB0 blood groups in the investigated population

Blood Group Type															
OI				AII				BIII				ABIV			
Nr.		%		Nr.		%		Nr.		%		Nr.		%	
39		33.33%		49		41.88%		22		18.80%		7		5.98%	
B	Gi	Bo	Gi	Bo	Gi	Bo	Gi	Bo	Gi	Bo	Gi	Bo	Gi	Bo	Gi
o	rls	ys	rls	ys	rls	ys	rls	ys	rls	ys	rls	ys	rls	ys	rls
y		s	s	s	s	s	s	s	s	s	s	s	s	s	s
1	24	12.8	20.5	22	27	18.8	23.0	13	9	11	8	3	4	2.5	3.4
5		2%	1%			0%	7%			%	%			6%	1%

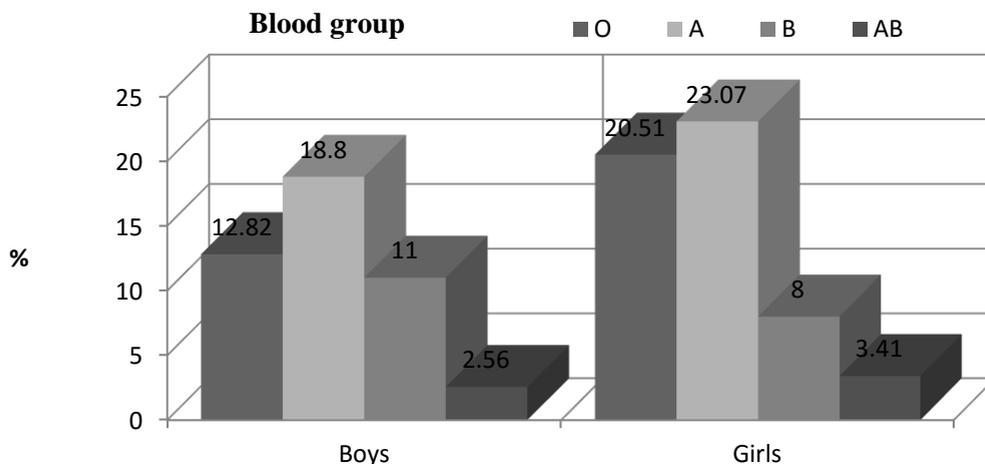


Figure 3. General frequency of the AB0 blood groups and gender distribution in the investigated population

Data regarding number of investigated pupils belonging to each blood group type grouped by the year of birth are presented in table 4. It can be observed the similar distribution characteristic for Romanian population.

Table 4. Number of investigated pupils belonging to each blood group type, based on year of birth

Year of birth	Blood group type							
	OI		AII		BIII		ABIV	
	n	%	n	%	n	%	n	%
1999	16	39.02	21	42.86	7	31.82	1	14.29
2000	11	26.83	14	28.57	8	36.36	4	57.14
2001	9	21.95	11	22.45	6	27.27	2	28.57
2002	5	12.20	3	6.12	1	4.55	0	0.00
TOTAL	41	100.00	49	100.00	22	100.00	7	100.00

Results regarding AB0 blood groups frequency in the investigated scholar population (experimental lot), are very similar with the mean of results obtained from CTS Piatra Neamț (Controle), for period 2010-2013 (Fig.4).

It can be noticed a slight increase of BIII group frequency, compared also with the mean value obtained from CTS Piatra Neamț in 2010-2013, as well as in 2008-2009 (Băra & Greșanu, 2010). The community of Răucești village is quite isolate, so it is interesting to follow in time the evolution of the gene pool. In this study the investigated population is not large enough to lead to a conclusion.

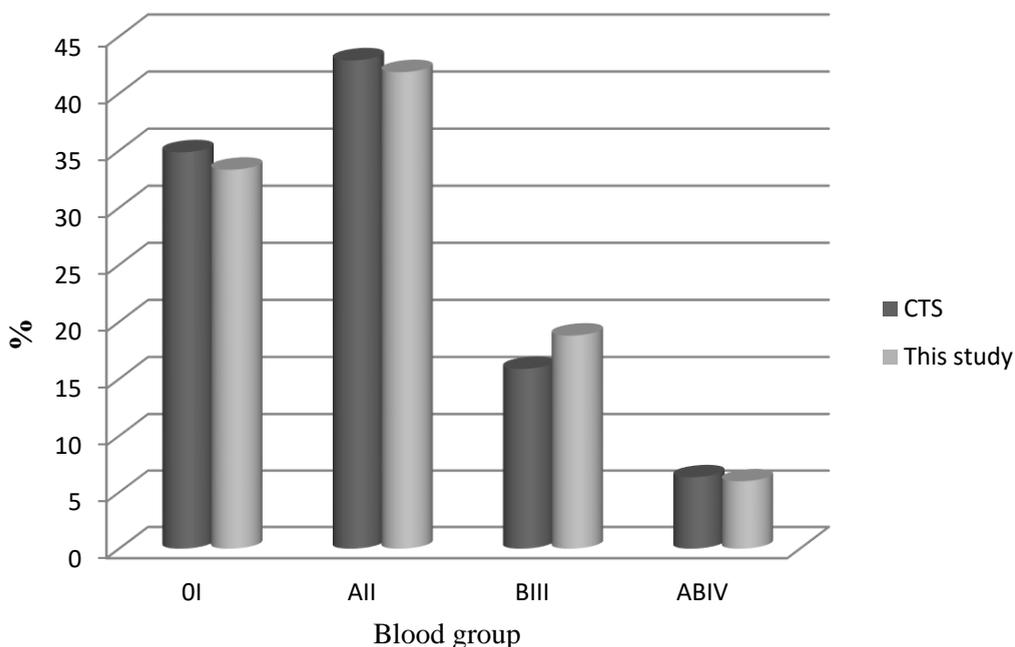


Figure 4: Frequency of AB0 blood groups for the experimental lot compared with mean frequency at CTS Piatra Neamț (Control)

Comparing blood group types depending of year of birth, it was noticed that results do not differ very much. So, for the 45 children born in 1999, determinations showed that 16 have O group, 21 have A group, 7 B group, 1 AB group. (figure 5, table 4).

For those born in 2000, results showed that: 11 have O group, 14 have A group, 8 B group, 4 AB group, and for those 28 born in 2001: 9 have O group, 11 have A group, 6 B group and 2 AB group. From the 9 investigated children born in 2002, no group ABIV was found. There were 5 with O group, 3 with A group and 1 with B group (figure 5, table 4).

Even if it is a quite isolated community, it can be observed that the blood groups frequency has the same repartition as for whole Romanian population and Neamț County. The predominant blood group is A, followed by Group O, Group B, and on the last place Group AB.

Even if number of boys were lower than of girls, regarding sex ratio, we observed that group BIII is more frequent at males. For AB group, the frequency is almost the same for both sexes. Groups A and O is more frequent at females, but because we have not investigated the same number of boys and girls, results are not conclusive.

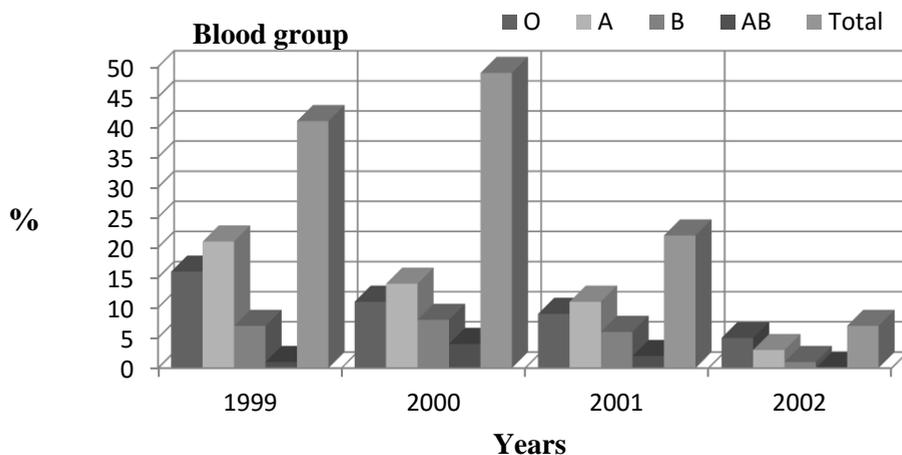


Figure 5: Frequency of AB0 blood groups for the investigated pupils, based on year of birth

CONCLUSIONS

The investigated population sample was composed of 117 children, born between 1999-2002, learning at at School Nr.1 Răucești, Neamț County, which determined blood group type between 2012 - 2013.

Results regarding AB0 blood groups frequency in the investigated scholar population, are very similar with the mean of results obtained from Transfusion Centre Piatra Neamț, for period 2012 – 2013.

Even if it is a quite isolated community, it can be observed that the blood groups frequency has the same repartition as for whole Romanian population and Neamț County.

ABO system blood groups frequency for Piatra Neamț, joins the normal parameters characteristic for the Romanian population, which is also in accordance with the general European values.

The predominant blood group is AII, followed by Group OI, Group BIII, and on the last place Group AB, not depending on sex of investigated person.

Regarding sex ratio, we observed that group BIII is more frequent at males even if number of boys were lower than of girls. For ABIV group, the frequency is almost the same for both sexes. Groups AII and OI is more frequent at females, but because we have not investigated the same number of boys and girls, results are not concludent.

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