UDC 575.17: 575.126: 612.118.221.2

O. U. Koretska[1], S. V. Bilokon[1], M. I. Lunha[2]

[1]Odesa National Mechnykov University, Department of Genetics and Molecular Biology, 2, Dvoryanska Str., Odesa, 65082, Ukraine

[2]Kiliya Central District Hospital, Pobedi st., 67, city of Kiliya, 68302, Kiliyskiy district, Odessa region, Ukraine

THE PREVALENCE OF BLOOD GROUPS *AB0* AND *RH* IN THE POPULATION KILIYSKY DISTRICT OF ODESSA REGION

This paper analyzes data on the distribution of phenotypes in *AB0* and *Rh* between 2500 people (980 men and 1 520 women) Kiliya district sample of those who are aged 17 to 94 years. *Rh* + phenotype was found in 82,6 % of the patients, and *Rh*-phenotype in 17,4 % of individuals. Frequency of phenotypes 0, A, B, AB, was: 34,0 %, 37,2 %, 20,2 % and 8,6 % respectively. In the study of the interconnection between combinations of *AB0* and *Rh* phenotype and age, the diverse character set in different age groups of men and women was found.

Keywords: phenotypes, *AB0* blood group system, *Rh*, age, man.

The *AB0* blood group system relates to the immune system with clear and simple, not related to the sex heredity, they are stable during life term and are used in clinical trials as genetic markers. The studies of these antigens, allows to find out a possible reference between *AB0* antigen system and many human pathological conditions (cancer, peptic ulcer disease and many others.) [3, 5, 8]. The relation between blood groups *AB0* and Rh and the level of serum cholesterol, protein fractions, urea and uric acid is installed [4, 11]. There is a connection of *AB0* and *Rh* with somatotypes, many anthropometric indicators, aging [6, 7].

Dew to the above mentioned, the purpose of the study was to determine the features of distribution of phenotypes combinations *AB0* and *Rh* in all ages of Kilia district in Odessa region. To achieve the goal we've set the following tasks:

1. Set frequency of phenotypes 0, A, B, AB and *Rh* in Kiliya population.

2. Identify the age and sex distribution features *AB0* and *Rh* phenotypes in the studding population.

Materials and methods

Work took place in the clinical diagnostic laboratory of Kiliya Central Hospital. The study involved 2 500 people (980 men and 1 520 women) with a random sample from Kiliya area residents aged from 17 to 94 years.

The age distribution was as follows: 17-44 years old - 1062 persons 45 - 59 years – 820 persons 60 - 74 years - 4S3 persons 75 - 94 years -135 people.

Through all residents we determined blood group systems *AB0* and *Rh* method using standard hemagglutination sera [9]. For *Rh* system showed only two common phenotypes - Rh + and Rh- [4].

Analyzed the frequency of occurrence of these combinations of phenotypes ABO and Rhesus: (0Rh +, 0Rh -, ARh+, ARh-, BRh +, BRh - , ABRh+ ABRh -).

The expected frequency of occuirence of blood group system AB0 calculated by the formula of Hardy - Weinberg [1].

Statistical analysis was performed using the material standard and specialized software (Statistical, methods approved in biology and medicine [2].

Results and discussion

The study found that surveyed people are with four main phenotypes AB0 blood group system. Blood group 0 was found in 850 surveyed, representing 34.0%, blood type A was noted in 930 individuals, representing 37.2%, B - in 505 (20.2%) patients and phenotype AB - at 8.6% surveyed (215 people) (Fig. 1).

The expected frequency of occurrence phenotypes blood group system AB0 was as follows: *0* – 36 %, *A* – 40 %, *B* – 17 % i *AB* – 7 %.

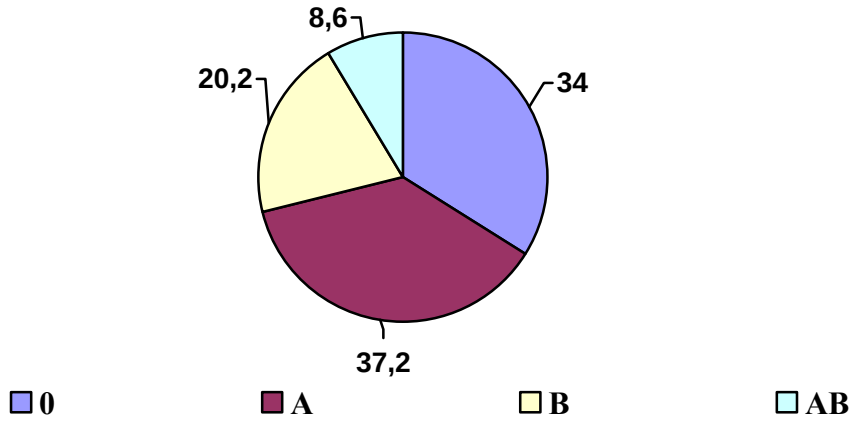

Fig. 1. Occurrence of blood group system ABO in Kiliya area

Rh - phenotype was found in 2065 individuals (82.6%) patients, and phenotype Rh - - in 435 individuals (17.4%).

The results in general phenotypes groups did not significantly differ from the general data of other researchers of residents in Ukraine [6. 9. 10].

The frequency of certain blood group system AB0 and "Rh" through people of all ages presented in Tables 1 - 4.

Tluough men group aged 17 to 59 remained medium population frequency blood group phenotypes, while in the age group 60 - "4 years was a tendency to reduce the number of carriers 0 phenotype and increased media and in comparison with data on men aged 17 - '44 (Table. 1).

Table. 1

The frequency of blood groups in men of all ages, n /%

Blood group	17 – 44 years	45 – 59 years	60 – 74 years	75 – 94 years	ALL
0	200 35,5 ± 1,4	84 32,8 ± 2,4	31 27,9 ± 2,0*	18 36,7 ± 2,2	333 34 ± 1,6
A	216 38,3 ± 2,1	104 40,6 ± 2,2	52 46,8 ± 1,9*	18 36,7 ± 2,5	390 39,8 ± 1,8
B	102 18,1 ± 1,8	46 18,0 ± 1,6	16 14,4 ± 2,1	9 18,4 ± 1,7	173 17,7 ± 1,4
AB	46 8,2 ± 1,7	22 8,6 ± 1,2	12 10,8 ± 1,3	4 8,2 ± 1,8	84 8,6 ± 0,8
ALL	564	256	111	49	980

Note: * - differences compared to the age group 17 - 44 years significant at $p \leq 0,05$.

Through women was noted the decrease of occurrence phenotype A and phenotype B was increasing in the age group 75 - 94 years compared to the youngest age group 17 - 44 years (Table. 2).

Table. 2

The frequency of blood groups in women of all ages, n /%

Blood group	17 – 44 years	45 – 59 years	60 – 74 years	75 – 94 years	ALL
0	174 34,9 ± 2,2	189 33,5± 1,5	123 33,1 ± 1,9	31 36,1± 2,4	517 34 ± 1,8
A	185 37,1 ± 1,8	204 36,2 ± 1,7	126 33,9 ± 1,5	25 29,1 ± 1,2*	540 35,5 ± 1,4
B	98 19,7 ± 1,6	125 22,2 ± 1,3	86 23,1 ± 1,1	23 26,7 ± 0,8*	332 21,8± 2,1
AB	41 8,2 ± 1,3	46 8,2 ± 1,2	37 9,9 ± 1,00	7 8,1 ±1,4	131 8,6± 0,6
ALL	498	564	372	86	1520

Note: * - differences compared to the age group 17 - 44 years significant at $p \leq 0,05$

When analyzing the frequency of occurrence of combinations of blood groups AB0 system with Rh factor, found that the frequency combinations phenotypes blood 0Rh + men in the age group 75 - 94 years had a tendency to decrease, and the frequency combinations phenotypes blood 0Rh- tended to increase relative to men aged 17 - 44 years (Table. 3).

Table. 3

The distribution frequency of phenotypes for blood group systems *AB0* and *Rh* in men of all ages,%

Blood groups	17 – 44 years	45 – 59 years	60 – 74 years	75 – 94 years
0 Rh^+	89,5	84,5	83,9	83,3*
0 Rh^-	10,5	15,5	16,1	16,7*
A Rh^+	93,5	92,3	88,5*	88,8
A Rh^-	6,5	7,7	11,5*	11,2
B Rh^+	87,3	84,8	87,5	88,9
B Rh^-	12,7	15,2	12,5	11,1
AB Rh^+	89,1	90,6	83,3	100*
AB Rh^-	10,9	9,4	16,7*	0*

Note: * - differences compared to the age group 17 - 44 years significant at $p \leq 0,05$

Also frequency combinations ABRh + phenotypes in the oldest age group tended to increase, and frequency combinations phenotypes ABRh- tended to decrease, but this may be due to a small sample (4 people).

Regarding the distribution of *Rh*-factor in women include the following features: in the age groups 45 - 59 years and 60 - 74 years marked tendency to increase the frequency of occurrence phenotype *A Rh* + and decrease of *A Rh*- phenotype compared to the youngest age group (Table. 4.). In the group of women over 75 years was seen an increase of *0 Rh* + phenotype and reduce the frequency of occurrence of phenotypes *0 Rh*-.

Among women of the oldest age group were not found any with *Rh*-negative blood group *AB*, and this can be explained by small sample (7 women).

Previous studies have found age changing characteristics of frequency system *Rh* phenotypes in men and women of all ages. Men compared to women in the age group 17 - '44 showed probable increase in the frequency of *ARh +,* and corresponding decrease in the frequency of *ARh*-. In the same age group found probable reduction of BRh + phenotype and increased *BRh*- phenotype compared to women.

Table. 4

The distribution frequency of phenotypes for blood group systems AB0 and *Rh* in women of all ages,%

Blood groups	17 – 44 years	45 – 59 years	60 – 74 years	75 – 94 years
0 Rh$^+$	89,7	92,0	94,3	93,5*
0 Rh$^-$	10,3	8,0	7,7	6,5*
A Rh$^+$	84,3	90,6*	94,4*	88,0
A Rh$^-$	15,7	9,4*	5,6*	12
B Rh$^+$	92,8	91,2	90,7	91,3
B Rh$^-$	7,2	8,8	9,3	8,7
AB Rh$^+$	92,6	91,3	91,8	100*
AB Rh$^-$	7,4	8,7	8,2	0*

Note: * - differences compared to the age group 17 - 44 years significant at $p \leq 0,05$

Through men of age 45 - 59 years was marked a decrease in the frequency of *0Rh +, BRh +* and an increase of 0Rh- and *BRh-* compared to women.

At the same time, was found that men in the age groups 60 - 74 years and 75 - 94 by the number of carriers of combinations *0Rh +* tends to decrease and phenotypes combination *0Rh-* tend to increase compared to women.

Compared to men in the group of women of 60 - 74 years there is an increase of the number of carriers of combination *ARh +* and reduction of *ARh-* combinations.

We can assume that this process partially associated with low viability of people with certain blood groups *AB0* and *Rh* and their elimination from the population.

While studying the connection between combinations of phenotypes *AB0* and *Rh* with age, we set the multidirectional character in different age groups of men and women.

Age-related change in the frequency of certain genotypes of blood groups and their associations is proofed in the influence of genes determining blood groups, the viability, morbidity and life expectancy; therefore hereditary factor in age-related changes must be considered in the prevention of premature aging and offer a set of preventive measures that would have warned it's acceleration.

Conclusions

1. In Kiliya population the frequency of phenotypes *0, A, B, AB* was 34.0%, 37.2%, 20.2% and 8.6% respectively. Rh + phenotype was found in 82.6% of patients, phenotype *Rh* - - 17.4% of people.
2. Through men of the age group 60 - 74 the tendency to reduce the number of carriers of phenotype 0 and tendency to increase the number of carriers of phenotype A in comparison with the age group of 17 - 44 years. There were found no differences in the distribution of phenotypes *AB0* in older age group/
3. Between women of the oldest age group (75 - 94 years) the reduction of occurrence of phenotype *A* and the increase of occurrence of phenotype *B* was found in comparison with the youngest group.

4. Was set the multidirectional character in different age groups of men and women.

References

1. Altukhov Yu. P. (2003) Genetic processes in populations [Geneticheskie protsessy v populyatsiyakh], Moskva: Akademkniga, 431 p.
2. Atramentova L. A., Utevskaya O. M. (2008) Statistical methods in biology [Statisticheskie metody v biologii], Gorlovka: Likhtar, 248 p.
3. Drannik G. N., Dizik. G. M. (1990) Genetic Systems of human blood and disease [Geneticheskie sistemy krovi cheloveka i bolezni], Kiev: Zdorov'ya, 198 p.
4. Zuy V. D., Poletyuk V. S. (1975) "The relationship between blood group system AB0, Rh factor and protein fractions of blood serum human" ["Vzaemozviazok mizh grupamy krovi systemy AV0, rezus-faktorom ta bilkovymy fraktsiiamy syrovatky krovi liudyny"], Visn. Kiivskoho un-tu. Ser. biol., № 17, pp. 36 – 41.
5. Knysh I. T., V. P. Kolodchenko V. P. (1984) The life expectancy of patients with osteosarcoma in connection with membership of the phenotypes AB0 and Rh systems [Prodolzhitel'nost' zhizni bol'nykh osteogennoy sarkomoy v svyazi s prinadlezhnost'yu k fenotipam sistem AV0 i rezus], Pervyy Vsesoyuznyy s"ezd meditsinskikh genetikov: Tez. Dokl, Kiev, 16 – 18 aprelya 1984, p. 46.
6. Kolodchenko V. P. (2011) Prevalence AB0 blood group system in people of all ages ["Poshirenist' grup krovi sistemi AV0 u lyudey riznogo viku"], Probl. stareniya i dolgoletiya, T. 20, № 4. pp. 458 – 463.
7. Kolodchenko V. P. (2012) Average combinations erythrocyte antigens of blood AB0 and Rh in all ages ["Rozpodil kombinatsiy erytrotsytarnykh antygeniv krovi system AV0 ta Rh u liudei riznogo viku"] Probl. stareniya i dolgoletiya, T. 21, № 2. pp. 163 – 170.

8. Prokop O., Geler V. (1991) Human blood group*s* [Gruppy krovi cheloveka], Moskva.: Meditsina, 512 p.
9. Starovoytova R. A. (1979) Ethnic genogeography Ukrainian SSR [Etnicheskaya genogeografiya Ukrainskoy SSR], Kiev: Nauk. dumka, 142 p.
10. Chen' I. B., Hrubinko V. V. (2003) The genetic patterns of population distribution territory Truskavets, Skhodnitsa (Lvov region.) on blood groups ["Henetychni zakonomirnosti rozpodilu naselennia teritorii Truskavets-Skhidnytsia (Lvivska obl.) za grupamy krovi"], Nauk. zapysky TDPU im. V. Gnatyuka. Ser. Biologiia, № 2 (21), pp. 58 – 61.
11. *Vij S. C.,* Maitrya B. B., Mali S. L. (1978) Genetic influence on serum creatinine, urea and uric acid, Indian J. Physiol. Pharmacol, № 3, pp. 1853 −1856.