

ABO AND RH BLOOD GROUPS DISTRIBUTION IN THE POPULATIONS OF LARESTAN AND LAMERD, FARS PROVINCE, IRAN

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Abstract

A total of 3204 ABO and Rh blood groups were investigated in Larestan and Lamerd populations, in Fars province, in Iran. The frequency of the A gene ranged from 16.54% to 21.96, the B gene from 15.85 to 27.77% and that of the d gene from 21.49 to 33.01%; compared with the gene frequencies of 20.97% for the A, 16.05% for the B and 28.50% for the d in the general population. It seemed that the two populations studied in the present investigation were characterized by a higher B and a lower A gene frequencies. Larestan and Lamerd areas had been malarious for several centuries and because the B phenotype has slight advantage at malarious condition, it appeared that, at least in part, the natural selection counts for the high level of the B gene in Larestani and Lamerdi compared with that in other populations of Fars province.

Introduction

Iran has one of the most heterogeneous population of the world (4-13, 1-3, 17-19) Most of these populations share in a common religious background but their genetic diversity is maintained through the geographical, ecological, linguistic, and cultural separation (4,18). However, information on the distribution of polymorphic traits in the populations of Fars province is still scarce (4,6,7,8).

The present study was done to improve our knowledge of the distribution of blood groups in Fars province.

Figure 1 shows the geographical location of Larestan and Lamerd areas of Fars province and the state of their seven residential units.

Materials and Methods

The ABO and Rh blood grouping data of 3204 blood donors from seven residential units of Larestan and Lamerd were collected. The X^2 test was used to compare phenotype frequencies of the populations.

Results and discussion

Phenotype and gene frequencies of ABO and Rh systems in seven residential population of Larestan and Lamerd together with those in the general population of Fars, as the control group, is shown in table 1. No deviation from the Hardy-Weinberg expectation was observed in any of the population examined. As it can be seen in table 1 the frequency of the A gene ranges from 16.54% to 21.96%, the B gene from 15.85% to 27.77%, and that of the d gene from 21.49% to 33.01% in Larestani and Lamerdi populations. These values fit well into the general range for other Iranian populations reported in the previous studies (4). The ABO system, however, shows significant heterogeneity ($X^2 = 105.3$; $P < 0.001$) between studied populations.

This heterogeneity is due to a higher value of the B Phenotype ranging from 25.08% to 32.35% compared with that of 22.90% in the control group.

According to several investigations in Italy, India, England and Uzbekistan, it seems a marked excess of the A blood group in patients suffering from malaria as compared with the O and B blood groups (15,16). It is shown that the distribution of the B blood group tends to correspond with a high degree of malaria endemicity (15). The south of Iran, including the Larestan and Lamerd areas, has been malarious for several centuries, until about 50 years ago. Taken together, seems that natural selection may be the cause of variation of blood groups of studied populations of Fars province.

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Table 1 - Phenotypes and gene frequencies for ABO and Rh systems in seven residential populations of Fars and the control group.

Population	Phenotype frequency					Gene frequency						
	A	B	O	AB	D-	D-	Total	p	q	r	D	d
Lar	24.77	29.98	38.77	6.48	90.39	9.61	1821	17.11	20.33	62.56	69.00	31.00
Khonj	28.93	32.99	32.49	5.59	89.85	10.15	197	19.30	21.88	58.82	68.14	31.86
Avaz	29.83	25.21	41.18	3.78	90.76	9.24	238	18.67	15.85	65.48	69.60	30.40
Sahra-e-Bag	23.53	32.35	27.94	16.18	92.65	7.35	68	21.96	27.77	50.89	72.89	27.11
Juyom	27.18	26.67	42.05	4.10	95.38	4.62	195	17.21	16.90	65.89	78.51	21.49
Ashkanan	32.27	25.08	36.70	5.50	89.60	10.40	327	21.54	16.79	61.67	67.75	32.25
Lamerdi	23.46	25.70	43.85	6.98	89.11	10.89	358	16.54	17.89	65.57	66.99	33.01
Fars*	30.93	22.90	39.57	6.60	91.88	8.12	57044	20.97	16.05	62.98	71.50	28.50

* Population of Fars province excluding Lamerdi and Larestani populations.

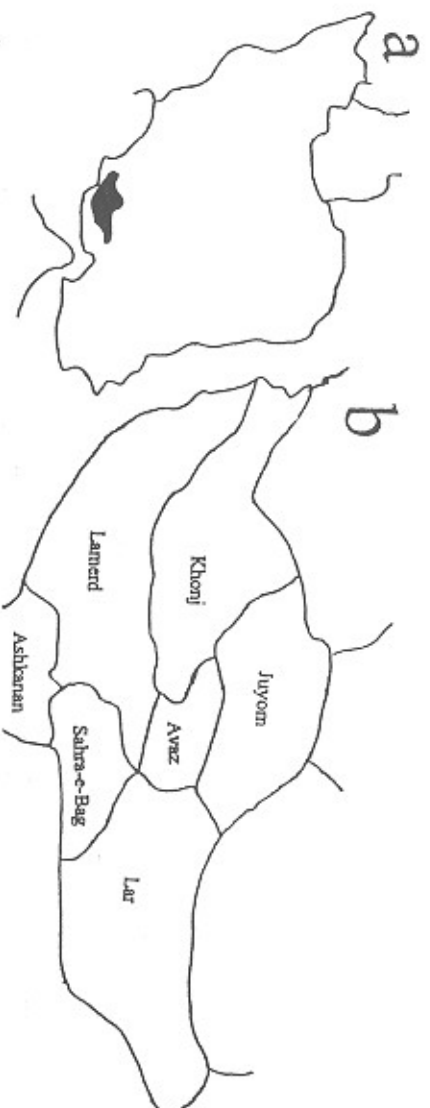


Fig 1. Geographical location of Larestan and Lamerdi areas (a , black area) and the state of their 7 residential units (b).

References

- 1- Akbari , M.T. , Papiha , S.S. , Roberts , D.F. and Farhud , D.D. (1984): Serogenetic investigations of two populations of Iran. *Hum. Hered.* 34: 371-377.
- 2- Akbari , M.T. , Papiha , S.S. Roberts , D.F. and Farhud , D.D. (1986): Genetic differentiation among Iranian Christian Communities. *Am. J. Hum. Genet.* 38: 84-98.
- 3- Akbari , M.T. , Papiha , S.S. , Roberts , D.F. and Farhud , D.D. (1986): Population genetics of the Persians and other peoples in Iran. *Z. Morph. Anthrop.* 76: 197-217.
- 4- Amirshahi , P. (1983): A Serological - Genetic study of Iranian and neighbouring population. Ph.D thesis University of Durham , Durham , U.K.
- 5- Amirshahi , P. , Farhud , D.D. , Sunderland , E. and Daneshmand , P. (1986): C3 Polymorphism in Iranian and neighbouring populations. *Indian. J. Phys. Anthropol & Hum. Genet.* 12 , 2 : 103-108.
- 6- Amirshahi , P. , Farhud , D.D. , Sunderland , E. , Tavakoli , Sh. and Daneshmand , P. (1987): A Genetic study of Iranian population: Blood groups. *Iranian. J. Publ. Health.* 16 , 1-4 : 65-89.
- 7- Amirshahi , P. , Farhud , D.D. , Sunderland , E. , Tavakoli , Sh. and Daneshmand , P. (1988): A genetic study of Iranian populations: serum proteins. *Iranian. J. Publ. Health.* 17 , 1-4 : 43-59.
- 8- Amirshahi , P. , Farhud , D.D. , Sunderland , E. , Tavakoli , Sh. and Daneshmand , P. (1989): A genetic study of Iranian populations: Red cell enzymes. *Iranian. J. Publ. Health* , 18 , 1-4 : 9-27.
- 9- Amirshahi , P. , Sunderland , E. , Farhud , D.D. , Tavakoli , S.H. , Daneshmand , P. and Papiha , S.S. (1989): Serum proteins and erythrocyte enzymes of populations in Iran. *Hum. Hered.* 39: 75-80.
- 10- Amirshahi , P. , Sunderland , E. , Farhud , D.D. , Tavakoli , Sh. , Daneshmand , P. and Papiha , S.S. (1992): Population genetics of the peoples of Iran. I. Genetic polymorphisms of blood groups , serum proteins and red cell enzymes. *Int. J. Anthropol* 17,3: 1-10.
- 11- Farhud , D.D. , Ananthakrishnan , R. , Walter , H. and Loser , J. (1973): Electrophoretic investigations of some red cell enzymes in Iran. *Hum. Hered.* 23: 263-266.
- 12- Farhud , D.D. and Walter , H. (1972): Hp subtypes in Iranians. *Hum. Hered.* 22: 184-189.

- 13- Farhud , D.D. and Walter , H. (1973): Polymorphism of C3 in German , Bulgarian , Iranian and Angola populations. *Humangenetik* 17: 161-164.
- 14- Kirk , R.L. , Bronya , K. , Black , N.M. , Medermid , E.M. , Ala , F. , Karimi , M. , Nickbin , B. , Shabazi , H. and Kmet , J. (1977): Genes and people in the Caspian Littoral: A population genetic study in Northern Iran. *Am. J. Phys. Anthropol.* 46: 377-390.
- 15- Mourant , A.E. , Kopec , A.C. and Domaniewska-Sobczak , K. (1976): The distribution of the human blood groups and other polymorphisms. Second edition. (Oxford University Press , Oxford , London).
- 16- Mourant , A.E. , Kopec , A.C. and Domaniewska - Sobczak , K. (1978): Blood groups and diseases. A study of associations of diseases with blood groups and other polymorphisms. (Oxford University Press , Oxford , London).
- 17- Nijenhuis , L.E. (1964): Blood groups frequencies in Iran. *Vox Sang.* 9: 723-740.
- 18- Papiha , S.S. , Amirshahi , P. , Sunderland , E. , Farhud , D.D. , Tavakoli , Sh. and Daneshmand , P. (1992): Population genetics of the peoples in Iran. II. Genetic differentiation and population structure. *Int. J. Anthropol.* 7 , 3: 11-18.
- 19- Papiha , S.S. , White , I. , Akbari , M.T. and Farhud , D.D. (1985): Isoelectric focussing of vitamin D binding protein (Gc): genetic diversity in the population of Iran. *Jpn. J. Hum. Genet.* 30: 16-17.
- 20- Singh , I.P. , Walter , H. , Bhasin , M.K. , Bhardwaj , V. and Sudhakar , K. (1986): Genetic markers and malaria. Observations in Gujarat , India. *Hum. Hered.* 36: 31-36.