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POPULATION GENETICS OF ABO BLOOD-GROUPS SYSTEM IN A
SAMPLE OF PREGNANCIES WITH AN ELEVATED RISK OF FAILURE –
FREQUENCY OF THE MATING TYPES.*

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Abstract

Study concerning the possible impact of ABO antigens relations between parental and filial generations has been studied using population genetics analysis of mating system in the three samples of pregnancies(births), different with regard to the estimated «a priori» pregnancy risk. The evidence obtained supports the view that the ABO incompatibilities do not affect significantly the fertility of the mating pairs.

Introduction

There are many reasons why it is important to assess clinically, as objective as possible, the risk level of every individual given pregnancy. In order to quantify the risks there are many parameters, coming mainly from the personal and familial anamnesis. In the last few years attempts have been made to involve the data regarding the genetics of the local populations in the evaluation of the individual pregnancies risk. An attempt was made to study different bioreproductive and hereditary traits of the population as possible elements in the procedures of risk quantitative assessment the individual pregnancies.

Materials and methods

A sample of 755 pregnant women, who applied for genetic counseling in the period 1989-1992, or have been diagnosed as pregnancies at risk in the University Clinical Center of Sarajevo, have been studied (sample A). Two subsamples have been observed

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separately, according to the clinical «a priori» genetical risk level estimate: subsample A1 - pregnancies at high risk (amniocentesis ordered), and subsample A2 – pregnancies at lower risk (amniocentesis not ordered). A group of 265 cases of disputed paternity, treated at the courts of Bosnia and Hercegovina (Bučić 1966), has been taken as the control group representing a random sample of the general population. All the individuals comprised in the (sub)samples have been tested with regard to their belonging to one of the four basic phenotypes of the ABO blood-groups system (A, B, AB and O). The composition of the material used for the study is shown in table 1.

Starting from the previously established basic population genetic parametres (Berberović & Redžić 1996), this study involves computing of the mating types frequency, and the elementary statistical comparison techniques (chi-square).

Table 1. *General properties of the studied sample*

			(SUB)SAMPLE SIZE (N)
PREGNANCIES INDICATED FOR GENETIC CONSULTATION	SAMPLE A	SUBSAMPLE A1	409
		SUBSAMPLE A2	346
GENERAL POPULATION SAMPLE (BUČIĆ 1966; "CONTROL GROUP")			265

Results

Basic population genetics parametres in the studied samples (frequencies of genes and genotypes, and the significance of the differences between them) have been published elsewhere (Berberović & Redžić 1996). No significant differences among the (sub)samples have been revealed in this respect.

In the present study the same samples have been studied with regard to the mating system patterns concerning basic ABO blood groups. The absolute and relative frequencies of the mating types are presented in the tables 2 and 3. A corporate view of the presented data point to the conclusion that there are no significant differences between the observed and expected mating pairs frequency in the studied samples (table 4).

It can be seen that the clinically estimated risk of failure varies prominently between the observed groups of pregnancies, which is reflected in the different clinical treatment prescribed for the individual

pregnancies (see table 1). The observed three samples of mating pairs exhibit an obvious gradation in this respect (A_1 , A_2 , and Bučić's sample – starting from the highest risk group).

Table 2. *Frequency of mating types*

MATING TYPES	FREQUENCY		
	A1 SUBSAMPLE	A2 SUBSAMPLE	BUČIĆ 1966
A × A	62	54	41
A × B	64	54	39
A × AB	19	26	23
A × O	133	112	73
B × B	12	9	11
B × AB	13	17	7
B × O	45	22	24
AB × AB	4	6	2
AB × O	21	16	9
O × O	36	30	36
TOTAL	409	346	265

Table 3. *Proportions of mating types*

TYPE OF MATING	SUBSAMPLE A1	SUBSAMPLE A2	BUČIĆ 1966
	0.15	0.16	0.15
A × A	0.16	0.16	0.15
A × B	0.05	0.07	0.09
A × AB	0.32	0.32	0.27
A × O	0.03	0.03	0.04
B × B	0.03	0.05	0.03
B × AB	0.11	0.06	0.09
B × O	0.01	0.02	0.01
AB × AB	0.05	0.05	0.03
AB × O	0.09	0.08	0.14
O × O			



Table 4. χ^2 test

<i>DISTRIBUTIONS (%) COMPARED</i>			χ^2	<i>p</i>
<i>OBSERVED</i>		<i>EXPECTED</i>		
OUR SAMPLE	A1	BUČIĆ 1966	6.59	> 0.50
	A2		7.12	> 0.50

Discussion and conclusions

There is a long lasting dispute about the consequences of the ABO blood groups mother-child incompatibility as reflected in the genetic aspects of the reproduction processes (e. g. mating pairs frequency) in the populations. While some researchers affirm that there is evidence for these reflections (Matsunaga & Itoh 1958, Matsunaga et al. 1962), others reached the opposite conclusions (though with slight reserves; Reed 1956, Reed & Ahronheim 1959). Despite the well known fact that the clinical manifestations of the newborn haemolytic anaemia due to ABO incompatibility are generally mild and have not an important clinical significance (Erak 1970), one could not exclude the possibility that the ABO blood groups relationships still play a role in the complex mother-child immunological interactions (Thompson et al. 1991). Our results could be interpreted as a contribution to the evidence supporting the formerly mentioned negative views expressed in the literature.

A simple conclusion seems to appear from the evidence drawn from the study of the corporate data on mating pairs frequency in the three observed samples, i. e. – the individual adherence to the different ABO blood groups have no impact to the chances of success of a given pregnancy.

Apstrakt

Posljednjih nekoliko godina poduzima se analiza bioreprodukcijских i populaciono – genetičkih pokazatelja u uzorcima trudnica, s ciljem utvrđivanja pokazatelja povišenog rizika za neuspjeh trudnoće. Ranije su utvrđeni osnovni populaciono-genetički parametri u posmatranim grupama (Berberović & Redžić 1996).

Raspoloživi podaci omogućavaju pristup nešto detaljnijoj populaciono-genetičkoj analizi, s obzirom na fenotipski sistem osnovnih ABO krvnih grupa. Posmatrani uzorak je formiran od 755 slučajeva trudnica koje su na Ginekološko-akušerskoj klinici u Sarajevu zatražile genetičku konsultaciju; radi se, dakle, o trudnoćama koje su iz različitih razloga unaprijed procijenjene kao povišeno rizične (Redžić 1996). Za 409 pripadnica ove grupe je ordinirana amniocenteza (poduzorak A1), dok kod 346 njih (poduzorak A2) nije bilo

indikacija za amniocentezu. Oba poduzorka obuhvataju pretežno žene sa područja sarajevskog regiona.

Bioreprodukcijski i populaciono-genetički pokazatelji praćeni su i u uzorku trudnica koji obuhvata slučajeve spornog očinstva (Bučić 1966), dakle, trudnoća bez primijećenog ili registrovanog genetičkog rizika.

Utvrđena je frekvencija pojedinih tipova parenja u proučenim uzorcima, kao i komparabilni podaci izvedeni računom iz materijala drugih izvora. Komparacijom je utvrđeno da nema statistički značajnih razlika, iako se radi o uzorcima čija je priroda u velikoj mjeri međusobno različita. Odstupanja u frekvenciji pojedinih tipova parenja nisu signifikantno različita u praćenim (specifičnim) uzorcima stanovništva Sarajeva u odnosu na populaciono genetičke podatke za širu populaciju Sarajeva i BiH.

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