

РОДСТВЕННЫЙ БРАК КАК МЕДИКО-СОЦИАЛЬНАЯ ПРОБЛЕМА

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Несмотря на наличие большого количества научных данных об отрицательном влиянии близкородственных брачных союзов на здоровье детей, рожденных в таких семьях, в настоящее время в целом ряде стран значимость данной проблемы не уменьшается.

Цель. Анализ современной научной базы по проблеме родственных браков, оценка их влияния на развитие той или иной патологии у детей.

В статье отражена позиция современных клинических рекомендаций, результаты последних исследований и некоторые спорные и нерешенные вопросы. Несмотря на наметившуюся тенденцию к снижению родственных браков в последние десятилетия, эта проблема затрагивает не менее 20% населения и десятки стран планеты. Распространенность кровнородственных браков в мире значительно варьирует, составляя от 0,1-0,4% в США и Европейских государствах до более 50% в странах Северной Африки, Ближнего Востока и Западной Азии. Наиболее частой формой родственного брака является брачный союз между двоюродными родственниками. В целом чаще в родственный брак вступают сельские жители, имеющие более низкий уровень образования.

Заключение. Несмотря на ряд положительных социальных и экономических сторон родственных браков, с точки зрения генетики и медицины следует принять во внимание негативное влияние кровнородственных браков, заключающееся в повышенном генетическом риске для потомства и высокой частоте врожденной патологии у новорожденных. Оценка социо-демографических аспектов близкородственных браков показывает, что их более широкое распространение во многих случаях объясняется плохим экономическим положением, отсутствием образования и низким уровнем социального обеспечения.

Ключевые слова: родственный брак; социально-демографические аспекты; генетика.

CONSANGUINEOUS MARRIAGE AS SOCIO-MEDICAL PROBLEM

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Despite the availability of a large amount of scientific data on the negative impact of consanguineous marriages on the health of children born in such families, the significance of this problem is not decreasing in a number of countries.

Aim. Analysis of the modern scientific base on the problem of consanguineous marriages, assessment of their impact on the development of a particular pathology in children.

The article reflects the position of modern clinical recommendations, the results of recent studies, and some controversial and unresolved issues. Despite the emerging trend of declining consanguineous marriages in recent decades, this problem involves at least 20% of the population and dozens of countries around the world. The prevalence of consanguineous marriages in the world



varies significantly, ranging from 0.1-0.4% in the United States and European countries to more than 50% in North Africa, the Middle East and West Asia. The most common form of consanguineous marriage is a marriage between first cousins. In general, rural residents who have a lower level of education are more likely to enter into consanguineous marriages.

Conclusion. Despite a number of positive social and economic aspects of consanguineous marriages, from the point of view of genetics and medicine, it is necessary to take into account the negative impact of consanguineous marriages, which consists in an increased genetic risk to offspring and a high incidence of congenital pathology in newborns. An assessment of the socio-demographic aspects of consanguineous marriages shows that their greater prevalence is often due to poor economic conditions, lack of education, and low social security.

Keywords: *consanguineous marriage; socio-demographic aspects; genetics.*

Despite the availability of a large amount of scientific data on the negative impact of consanguineous marriages on the health of children born in such families, the significance of this problem is not decreasing in a number of countries [1].

In genetics relatives are defined as individuals having a *part of genes of common origin*. Two individuals are considered to be close relatives if they have at least one common ancestor (*only parents, grandparents, great grandparents* are considered). Marriage between relatives is called *consanguineous marriage*, or *inbreeding* [2-4].

In kinship communities, consanguineous marriages can be of different types: most often they are concluded between cousins and second cousins, less often between an uncle and a niece [3,5]. Marriage between siblings (incest) in most world cultures is considered unacceptable and is prohibited by law. To assess the degree of kinship between representatives of different populations, *coefficient of inbreeding* is used, which is determined as *the probability that two alleles at any locus in an individual are identical by descent from the common ancestor of the two parents* [4]. Coefficient of inbreeding is a quantitative measure of inbreeding; it is intended to assess kinship between parents, although it is estimated by progeny [3].

Aim – analysis of the modern scientific base on issues of consanguineous marriages, evaluation of their influence on a particular pathology in children.

The adverse effects of inbreeding are manifested by the fact that the recessive genes of hereditary diseases will be in the totality of genes inherited from common ancestors. Accordingly, in children of parents who are blood relatives, they can go into a homozygous state. Therefore, with an increase in the degree of kinship of parents, a part of the genome of common ancestors can increase, which will go into a homozygous state. This, in turn, increases the probability for appearance of recessive hereditary diseases in it. In most cases, the lower the frequency of the gene for a recessive disease in a population, the higher the chances that such a disease will manifest in an consanguineous marriage [3].

For example, if the frequency of a gene of a recessive disease in a population is 0.001, the probability for heterozygosity of a wife and a husband for this gene will be 0.000004. However, if one of marriage partners is a carrier of this gene, the probability for the second partner to have this gene equals the coefficient of kinship between partners. This, for cousins this value will be 0.125, that is, it will be 125 times the population value [3].

At the same time marriage between first cousins in itself does not always suggest initiation of a genetic disease [6]. Children from these marriages will be under increased risk only in case they carry the same mutant gene at a given locus.

Since relatives are more often heterozygous for the same mutant gene (identical in

origin) than non-relatives, in the consanguineous marriages there exists a higher probability for progeny having an autosomal-recessive trait. If frequency of harmful alleles is very low, the probability of appearance of these alleles in homozygous conditions in panmictic populations will be also lower. If a mutant gene that causes a disease, is prevalent in the population, the risk of birth of a child with the given pathology in such marriages is absent [5].

Despite a negative attitude to consanguineous marriages in most Western countries from the point of view of enhanced genetic risk for the progeny, they have the following positive social and economic aspects:

1. strengthening of family relations and preservation of the property within a family;

2. improvement of a position of a woman due to reduction of the risk of being abused by her husband if he is linked with her with family ties, and decrease in the probability for divorce;

3. consanguinity ensures unity of land (inheritance of land by men and women is carried out within the same family, and this is of great importance for peasants, since small plots of land are inefficient in agriculture; this model is common among Lebanese, Egyptians, Palestinians and Jordanians);

4. consanguinity implies the best relationship and compatibility between husband and wife, daughter-in-law and mother-in-law; besides, it permits to effectively circumvent undisclosed problems concerning the health or other adverse social characteristics of the fiancée or fiancé;

5. consanguineous marriages create a certain balance in the family tree within the family clan, ensuring the marriage of young women with men within the family, which means reducing the problems of singlehood;

6. anthropologists have long ago come to the common opinion that the main achievement of consanguineous marriages is inheritance of a peculiar family structure (specific peculiarities of thinking) and of property;

7. most important and fundamental causes of consanguineous marriages both in

the South Asia and in the Near East are social and cultural considerations [7-9].

Despite the growing urbanization, isolation of families, and also increase in literacy of women, in some countries the choice of marriage still remains to be the prerogative of parents reinforced by direct and indirect support of elder married brothers and sisters.

Kinship marriages are traditional in at least 20% of the world population [10]. In some countries the choice of a spouse is traditionally a decision not only of a couple, but also of a family or a family clan, although the frequency of arranged marriages in recent years has been declining due to increase in the number of women getting higher education that provides more opportunities for choosing a marriage partner [11].

In result of studying and generalization of the results of more than 100 scientific research works, the data of global spread of marriages between relatives were obtained [13].

From this point of view, populations can be divided into four main categories: those where consanguineous marriages make less than 1%; from 1 to 10%; from 20% and more, and those where the level of consanguinity is unknown because of absence or insufficient reliability of the data. Here, categorization of the population will be as follows: 1.061 billion of individuals make the population with less than 1% of consanguineous marriages; 2.811 billion – with 1% to 10%; 991 million – with more than 20% and for 1.064 billion this frequency is unknown.

Evaluation of modern global tendencies of the consanguineous marriages shows that frequency of consanguineous marriages varies in rather a wide range depending on the ethnicity, religion, culture and region of residence. Thus, in Western countries the prevalence of such marriages is very low, in particular, according to research data, this parameter in Western Australia is 0.23% with coefficient of inbreeding 0.00009 [14], in the USA – 0.1-0.2% and 0.0001, respectively; in Great Britain – 0.2-0.4% and 0.0001-0.0003 [13].

At the same time, such marriages are traditional for the most countries of North Africa, Near East and Western Asia, especially in the communities where the predominating religion is Islam. In these countries from 20% to 50% of all marriages are consanguineous marriages [15,16]. In some Arabic countries consanguineous marriages make more than half of all marriages, for example, in Sudan 65% of all women are married to relatives, in Saudi Arabia – 57.7%, in the United Arab Emirates – 50.5% [15]. In Europe, North America and Australia such marriages are practiced mainly among emigrants from such regions as Pakistan, Turkey, North Africa and Lebanon [12].

Research conducted in some southern states of India, also evidence a high prevalence of consanguineous marriages [17]. Thus, in Tamil Nadu state the frequency of such marriages was 39.2 and 61.6%; among them there were marriages between first cousins [18]. In Karnataka, 24.1% of marriages were consanguineous, and 51.7% of them were marriages between first cousins [19]. In Andhra-Pradesh the total amount of marriages was 27.5% with coefficient of inbreeding 0.0172. The overwhelming majority of these consanguineous marriages were between an uncle and a niece – 75.8% [20].

By the results of studying consanguineous marriages in 8 of 34 provinces of Afghanistan, their share was on average 46.2%, ranging from 38.2% to 51.2% with coefficient of inbreeding from 0.0221 to 0.0293, respectively. The most common type of marriages were between first cousins accounting for 27.8% of the total marriages; in 6.9% there were marriages between double cousins, and 5.8% – between second cousins [21].

According to Turkish scientists, by 1994 the frequency of consanguineous marriages in the country was on average 21.1%, with variations from 30.8% in Eastern Anatolia to 12.8% in Western Anatolia. The overwhelming majority of these marriages were unions of male and female first cousins – 69.8%, and 13.8% were marriages between second cousins

[22]. By 2013 the authors reported a decline of such marriages in Turkey to 18.5%, most of which – 57.5%, were marriages between first cousins [23].

In Egypt the average prevalence of consanguineous marriages is 37.5% with the lowest value – 24.1% in Nuweiba and the highest – 52.3% in Abu Rudeis; 60% of marriage partners were first cousins, the average coefficient of inbreeding was 0.0184 [24].

Despite rather high prevalence, a change in this parameter compared to previous years was revealed in many countries in a study of the frequency of consanguineous marriages in the dynamics of recent decades. Thus, an assessment of the trends in kinship marriages over the past 40 years in Iran showed the dynamics of constantly decreasing frequency of kinship marriages from 40.5% in the early 1980s to 31.3% in 2000-2005 [25]. In Bahrain, from 39.4% in 1990 and 24% in 1998, the parameter dropped to 6.8% in 2009 [26]. In Jordan, since 1990 this frequency decreased from 56.8% to 39.5% in 2007 and to 34.6% in 2012 [27].

In the Palestinian territories (the West Bank and Gaza Strip), the number of consanguineous marriages slightly decreased from 54.1% in 1983 and 42.1% in 1993-1996 to 36.4% in 2004 [28]. A similar trend was observed in Oman, where the number of consanguineous marriages decreased from 54.3% in 1995 to 51.6% in 2000 and 49.3% (95% confidence interval (CI) 46.0-56.2%) in 2008. 43.0% Of marriages were concluded between first cousins [29,30].

At the same time the amount of kinship marriages in Qatar rose from 41.8 to 54.0% in 2004, with simultaneous increase in the coefficient of inbreeding from 0.01913 to 0.02706 [31].

Today a marriage between first cousins is the most common form of consanguineous marriage in most countries, in this case the spouses inherit 1/8 of their genes from a common ancestor [32]. Thus, coefficient of inbreeding in marriage between first cousins is 1/16. In Yemen with total frequency of consanguineous marriages 44.7% (95% CI

41.7-47.7%) and coefficient of inbreeding 0.02442, marriages between first cousins accounted for 71.6% of all such marriages [33].

Iranian researchers found a high frequency of consanguineous marriages making 37.4% of total marriages. In this structure, 19.3% of marriages were between first cousins and 18.1% – between second cousins. The average coefficient of inbreeding was 0.0149 [25].

A study of consanguineous marriages in Qatar showed that their frequency is 54.0% with CI 52.3-55.7%. Marriages between first cousins made 64.4% of the total amount of such unions. Evaluation of the relative risks of concluding intera consanguineous marriage showed that it equals 1.56 if parents of one spouse are in the consanguineous marriage, and 1.96 if parents of both spouses are in the consanguineous marriage. It follows from here that young people enter consanguineous marriages twice as often if their parents are in such marriage [31,34].

Evaluation of socio-demographic aspect of consanguineous marriages shows that their wide spread in many cases is associated with poor economic situation, absence of education and low social security level [35].

Lebanese researchers found that such factors as lower level of education both of men and women, non-Christian religion, women who are housewives and residents of rural areas, have a positive correlation with a higher frequency of consanguineous marriage and medium coefficients of inbreeding [36]. In Iran, on the whole, rural residents also more often enter consanguineous marriages than urban residents.

Another determining factors is education of spouses – 43.5% were individuals without education or with the primary education, and only 13.9% had higher education [25].

In Syria 30.3% of marriages in cities and 39.8% in rural regions were consanguineous marriages with inbreeding coefficient 0.0203 and 0.0265, respectively.

Similar characteristics of the partners of kinship marriages were noted by researchers of

other countries, in particular, of Oman, Iran, Yemen, Pakistan and Turkey [29,38,39]. In Jordan, women with no education, secondary or incomplete secondary education at least 17-38% more often enter consanguineous marriage than women with higher education. For rural residents, the relative risk (RR) for entering consanguineous marriage was 1.18 with 95% CI 1.04-1.34. Women-housewives who do not have a specific profession and job, enter consanguineous marriage with 1.1 times higher probability (OR=1.1; 95% CI 1.01-1.27) compared to working women [35].

In the CIS countries, consanguineous marriages are most common in Azerbaijan and the states of Central Asia. However, research works directly studying the prevalence of such marriages and assessment of the coefficient of inbreeding in populations, are scarce.

The data available in literature, as a rule, consider the matter of consanguineous marriages in relation to a particular pathology of children and adults.

In the Azerbaijan Republic, an estimate of the frequency of consanguineous marriages revealed their highest number – 62.6% among the rural population of Lerik region and the lowest – 14.1% – in the Tazuz region of the Ganja-Kazakh zone of the country. 74.6% of males and female cousins were in the marriage. The inbreeding coefficient (with an average population value in the republic of 0.0103) amounted to 0.0265. A study of the structure and factors of congenital and hereditary forms of ENT diseases revealed that 37.6% of patients with pathology of the ear, 33.5% of patients with pathology of the nose and paranasal sinuses, 44.0% of patients with pathology of the pharynx were born in kinship marriages [38,39]. The high frequency of kinship marriages in the country is also confirmed by the authors of other studies [32,40]. F.O. Seidbekova reports a 32-fold increase in the risk of congenital malformations in consanguineous marriages [33].

In the Russian Federation this problem is most characteristic of Dagestan. According to

A.R. Akhmedova, when studying the marriage structure in relation to iron deficiency anemia, a high frequency of endogamous and inbred marriages was established in the sample – 61%. Relatively high rates of inbreeding coefficient was also found – from 0.0029 in Lezghians to 0.0113 in Laks [34].

A high frequency of consanguineous marriages in Uzbekistan among women that gave birth to children with congenital malformations of maxillofacial region (20.97%), is reported in the work of A.Sh. Inoyatov [35]. Another work studying neurosensory deafness, indicates the frequency of inbred marriages among the examined individuals 36.8% that more than twice exceeds the parameter in the general population. The highest amount of these marriages were between first cousins: children of sisters – 42.5%, children of brothers and sisters – 35.8, and children of brothers 21.7% of cases [36].

A high frequency of consanguineous marriages in Tadjikstan is reported in connection with neuromuscular diseases, hereditary diseases of neuromuscular system [37], deafness [35], complicated nephrolithiasis [40].

In summary, it should be noted that

consanguineous marriages in the country present not only medical, but serious socio-economic problems which are being discussed at a high governmental level.

Conclusion

Thus, a problem of consanguineous marriages today is important in many countries of the world. Despite the emerging tendency to reduction in recent years, this problem involves not less than 20% of population and dozens of countries worldwide. The prevalence of consanguineous marriages in the world varies from 0.1- 0.4% in the USA and European countries to more than 50% in the countries of North Africa, Near East and Western Asia.

The most common form of a consanguineous marriage is marriage between the first cousins. In general, consanguineous marriages are more common in rural population with a lower level of education.

Despite a number of positive social and economic aspects of consanguineous marriages, their negative influence from the positions of medicine and genetics should be also taken into account, that consists in a high genetic risk for progeny and a high frequency of congenital pathology in newborns.

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