Autosomal recessive diseases among Palestinian Arabs

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Abstract
As a consequence of the high consanguinity rate among the Palestinian Arabs, many recessive disorders are present with a relatively high frequency. In a survey of 2000 different Palestinian Arab families who visited our genetic clinic, in 601 an autosomal recessive disease was diagnosed or strongly suspected. The distribution of these disorders was not uniform and some disorders, such as Krabbe disease, were found at high frequency in only a small part of the population. For some other disorders, a high prevalence was also reported among Palestinian Arabs living in other regions, for example, β thalassaemia, Bardet-Biedl syndrome, Meckel syndrome, autosomal recessive congenital hydrocephalus, and recessive osteopetrosis. In addition, as another consequence of the high consanguinity rate, two different autosomal recessive diseases were diagnosed within the same sibship in 17 of the Palestinian Arab families.

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Middle Eastern societies, particularly the Arab rural population, are characterised by close family relationships.¹ The preference for marrying relatives is a deeply rooted cultural trait and even though the major religions discourage consanguineous mating they are very prevalent in the region. In these societies genetic disorders are relatively frequent, in particular autosomal recessive diseases.^{1,2} The knowledge of which recessive disorders are frequent in a defined population is the first requirement for a programme towards their prevention.

Most of the Palestinian Arab population which is living within the State of Israel and the territories under the Palestinian authority is rural and in 45% of the families the spouses are related.³ In a survey of 2000 different Palestinian Arab families who visited our clinic,² in 464 an autosomal recessive disease was diagnosed and was strongly suspected in another 137 (table 1).

The distribution of autosomal recessive disorders among the Palestinian Arab population is not uniform and some of the diseases which were relatively frequent in our clinic are found at high frequency in only a small part of the population. An example is Krabbe disease in which 18 of the 21 different families originated from only two small geographical regions.⁴ All the patients affected with Krabbe

disease were homozygous for the same mutation because of a founder effect, different in each of the two regions.⁵ A similar situation was also observed for other diseases, and it may be expected that with time, because of marriages outside the region, some will become frequent in the whole Palestinian Arab population. Other diseases, such as β thalassaemia, are already found at a high frequency in the whole population and indeed the families seen in our clinic originated from many different villages/towns; however, there were some villages in which the disease was particularly frequent. It seems that β thalassaemia is frequent in this population because of two different processes: a selective advantage to the carriers and multiple founder effects with genetic drift.⁶ For some other disorders frequently seen in our clinic, the high prevalence was also observed among the Palestinian Arabs living in other regions,¹ for instance, Bardet-Biedl syndrome, Meckel syndrome, autosomal recessive congenital hydrocephalus, or recessive osteopetrosis.^{1,7,8}

The relatively high frequency of many recessive disorders among the Palestinian Arabs is not the only consequence of the very high rate

Table 1 Autosomal recessive disorders

	No of families
<i>Autosomal recessive diseases</i>	
Ataxia telangiectasia*	13
Bardet-Biedl	7
Cystic fibrosis*	28
Deafness	31
Epidermolysis bullosa	7
Fanconi anaemia*	5
Glaucoma, congenital	6
Hydrocephalus, congenital	20
<i>Lysosomal diseases*</i>	
Krabbe	21
Metachromatic leucodystrophy	15
Niemann-Pick type A	12
Hurler	10
Gaucher	10
Mucopolidosis II and III	9
Others	27
Male pseudohermaphroditism*	22
Microcephaly	9
Meckel syndrome	10
Nephrotic syndrome, congenital	7
Niemann-Pick type C*	9
Osteopetrosis	5
SMA type I	8
β thalassaemia*	76
Sickle thalassaemia/sickle cell anaemia*	10
Warburg syndrome	5
Other recessive diseases	82
<i>Probable autosomal recessive disorders</i>	
Mental retardation	29
Undiagnosed syndromes	18
Undiagnosed syndromes with infantile death	37
Undiagnosed syndromes, suspected storage diseases	17
Undiagnosed syndromes, degenerative diseases of the nervous system	36
Total	601

*Diseases which were selectively referred to us.

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of consanguinity in this population. In the present survey, in 17 of the families two different autosomal recessive disorders were diagnosed within the same sibship. Therefore, the existence of two different autosomal recessive diseases within one family, which is often seen as exceptional, must be taken into consideration in very inbred communities.⁹⁻¹⁰ Other consequences of the high consanguinity rate were also seen in the Palestinian Arab population, in particular homozygosity for dominant genes.¹¹ It is probable that homozygosity for genes involved in the pathogenesis of multifactorial disorders is one of the major causes of the increased rate of major malformations reported in this population.¹²

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