

CONSANGUINEOUS MARRIAGES AMONG IRANIAN MANDAEANS LIVING IN SOUTH-WEST IRAN

MOSTAFA SAADAT¹ AND MAHDIS ZARGHAMI

Department of Biology, College of Sciences, Shiraz University, Iran

Summary. Several studies have indicated that consanguineous marriages (unions between biologically related persons) are associated with increased risk of autosomal recessive diseases and several multifactorial traits. Mandeans are a closed ethno-religious community living in areas of southern Iraq and Iran (Khuzestan Province). There are currently no data on the prevalence of consanguineous marriages among Mandeans. The present study was carried out in 2016 to determine the prevalence of consanguinity among Iranian Mandeans living in Khuzestan Province, south-west Iran. A total of 137 couples (urban areas: 79 couples; rural areas: 58 couples) were included in the study. Information on the consanguineous marriages of the subjects was collected through direct interviews. Marriages were classified by the degree of relationship between couples as double first cousins, first cousins, first cousin once removed, second cousins and unrelated marriages. The coefficient of inbreeding (F) was calculated for each couple and the mean coefficient of inbreeding (α) estimated for the population, stratified by rural and urban areas. The overall frequency of consanguinity was found to be 50.7% in urban and 86.2% in rural areas. There was a significant difference between rural and urban areas in types of marriages ($\chi^2 = 24.8$, $df = 4$, $p < 0.001$) and first cousin marriages (51.8%) were the most common type. The overall α -value was estimated to be 0.0363 for the Iranian Mandaean population.

Introduction

A consanguineous marriage is defined as a union between biologically related persons. This type of marriage is common in many Asian and African populations (Saha & El Sheikh, 1988; Tuncbilek & Koc, 1994; Bittles, 2001; Alper *et al.*, 2004; COSIT, 2006; Othman & Saadat, 2009; Shawky *et al.*, 2011; El-Kheshen & Saadat, 2013). Iranian populations show high levels of consanguineous marriages (Saadat *et al.*, 2004; Rafiee & Saadat, 2011). Consanguinity is a long-standing social habit (Bittles, 2001; Saadat, 2007, 2008b) and its frequency is associated with several demographic, religious, cultural and

¹ Corresponding author. Email: saadat@shirazu.ac.ir

socioeconomic factors (Bittles, 2001; Hamamy *et al.*, 2005; Akrami & Osati, 2007; Saadat, 2007).

Considering that consanguinity results in homozygosity in offspring, it is associated with an elevation in the risk of autosomal recessive disease and several multifactorial complex traits (Bittles & Neel, 1994; Stoltenberg *et al.*, 1999; Bittles, 2001; Saadat & Zendehe-Boodi, 2006; Saadat, 2008a; Tadmouri *et al.*, 2009; Mansour *et al.*, 2010; Saadat & Vakili-Ghartavol, 2010; Nafissi *et al.*, 2010, 2011; Anvar *et al.*, 2011; Saadat, 2011, 2015a).

Previous studies have shown that Iranian people are a heterogeneous population (Amirshahi *et al.*, 1992; Rafiee *et al.*, 2010; Fallahzadeh-Abarghoeei *et al.*, 2015; Saadat, 2015b). The Mandaean community is one of the Iranian sub-populations. Mandaeans are a closed ethno-religious community, practising Mandaism, which is a Gnostic religion (Aramaic *manda* means 'knowledge', as does the Greek *gnosis*). Mandaism has a strongly dualistic worldview. The connection with the Quranic Sabians provided them with acknowledgment as People of the Book – a legal minority religion within the Muslim community. According to most scholars, Mandaeans migrated from Jordan/Palestine areas to southern Iraq and south-west Iran areas about 2000 years ago. They are Semites and speak a dialect of Eastern Aramaic known as Mandaic. Aramaic is a language family belonging to the Semitic subfamily of the Afroasiatic language family (Buckley, 2002).

The patterns of consanguinity among several Iranian populations have been reported previously (Saadat *et al.*, 2004; Rafiee & Saadat, 2011). To the authors' knowledge, there are no data for prevalence of consanguineous marriages among Iranian and Iraqis Mandaeans. Therefore, the present study was carried out in Khuzestan Province.

Methods

Subjects

This cross-sectional study was carried out in Khuzestan Province in south-west Iran in 2016. A total of 137 Mandaean couples (urban areas: 79 couples; rural areas: 58 couples) were included in the study. No other ethnic/religious groups were included. Data on consanguineous marriages were collected using a simple questionnaire by interview. The questionnaires were completed by a trained interviewer. The work has been carried out in accordance with the Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies in humans. Informed consent was obtained from all participants.

Consanguineous marriages

The coefficient of inbreeding (F) is the probability that an individual has received both alleles of a pair from an identical ancestral allele. Marriages were classified by the degree of biological relationship between couples as double first cousins ($F = 1/8$), first cousins ($F = 1/16$), first cousin once removed ($F = 1/32$), second cousins ($F = 1/64$) and unrelated marriages ($F = 0$). The average coefficient of inbreeding (α) was calculated as $F = \sum P_i F_i$, where P_i and F_i are the frequency and coefficient of inbreeding of each mating type, respectively.

First cousins may be the children of two brothers (patrilateral parallel cousins), two sisters (matrilateral parallel cousins) or a brother and a sister (cross-cousins).

Statistical analysis

The chi-squared test (χ^2) was used to compare mating pattern frequencies between study groups. Statistical analysis was performed using the statistical software package SPSS (SPSS Inc., Chicago, IL, USA; Version 11.5). A probability of $p < 0.05$ was considered statistically significant.

Results and Discussion

Table 1 shows the frequency of the various types of marriages in urban and rural areas. The data showed that the overall frequency of consanguinity was 50.7% in urban and 86.2% in rural areas. The equivalent mean inbreeding coefficient (α) was 0.0272 and 0.0487 in urban and rural areas, respectively. There was a significant difference between rural and urban areas for the types of marriages ($\chi^2 = 24.8$, $df = 4$, $p < 0.001$). This means that consanguinity was higher in rural areas compared with urban areas. A similar finding has been reported by other investigators in Algeria (Benallegue & Kedji, 1984), Jordan (Khoury & Massad, 1992), Iraq (COSIT, 2006), Turkey (Alper *et al.*, 2004), Egypt (Hafez *et al.*, 1983), Syria (Othman & Saadat, 2009) and Afghanistan (Saify & Saadat, 2012; Saadat & Tajbakhsh, 2013).

First cousin marriages (51.8%) were the most common type of marriages and the α -value was estimated to be 0.0363 for the Iranian Mandaean population. The rates of first cousin marriages were 35.4% and 74.1% in urban and rural areas, respectively.

It should be noted that among several west Asian countries, the most common form of consanguineous marriage is between first cousins (Hafez *et al.*, 1983; Tuncbilek & Koc, 1994; Alper *et al.*, 2004; Hamamy *et al.*, 2005; Othman & Saadat, 2009; Rafiee & Saadat, 2011; El-Kheshen & Saadat, 2013). Among Iranian populations, first cousin marriages account for about 28% of all marriages (Saadat *et al.*, 2004), which is similar to the findings of other reports from Arabic countries (Hafez *et al.*, 1983; Benallegue & Kedji, 1984; Khoury & Massad, 1992; Othman & Saadat, 2009; Shawky *et al.*, 2011; El-Kheshen & Saadat, 2013). The present finding might be at least in part interpreted by the fact that Mandaeans originated in the west of Asia (Buckley, 2002), and that consanguinity was deeply rooted in the populations living in these areas (Bittles, 2001; Saadat, 2007, 2008b).

Table 1. Frequency distribution of different types of consanguineous marriages in Iranian Mandaeans, Khuzestan Province, 2016

Type of marriage	Urban areas <i>n</i> (%)	Rural areas <i>n</i> (%)	Total <i>n</i> (%)
First cousins	28 (35.4)	43 (74.1)	71 (51.8)
Double first cousins	1 (1.3)	0 (0)	1 (0.7)
First cousins once removed	7 (8.9)	2 (3.4)	9 (6.6)
Second cousins	4 (5.1)	5 (8.6)	9 (6.6)
Unrelated	39 (49.3)	8 (13.8)	47 (34.3)
Total	79	58	137

Patrilateral parallel cousin marriages were the most common type of consanguineous marriages among Mandaeans (data not shown). It should be noted that it is a similar story in Iran (Saadat *et al.*, 2004), Syria (Othman & Saadat, 2009), Lebanon (El-Kheshen & Saadat, 2013) and several other populations in Asia (Saify & Saadat, 2012; Saadat & Tajbakhsh, 2013).

The prevalence of consanguinity among the Arab population living in Iran has previously been reported to be 49.0% (Saadat *et al.*, 2004). Although Mandaeans and Arabs are Semites, there a significant difference was found between these populations regarding consanguineous marriages ($\chi^2 = 303.3$, $df = 4$, $p < 0.001$). Mandaeans showed a higher level of consanguinity compared with Iranian Arabs mainly living in Khuzestan Province. This point confirms that consanguineous marriages are a very important factor in maintaining social stability (Tadmouri *et al.*, 2009). Therefore, it might be concluded that, at least in part, Mandaeans selected a high level of consanguineous marriages to keep their ethno-religious community.

On the other hand, it has been shown that attitude and subsequently practice towards consanguineous marriages is strongly correlated with the historical background of populations (Saadat, 2007, 2008b). Iranian Mandaeans originated from the west of Asia (Buckley, 2002), where at the present time consanguinity is high in these populations. It seems that a high level of marriages with relatives was a feature of west Asian populations.

It should be mentioned that the small sample size was a major limitation of this study. The study demonstrated a very high level of consanguineous marriage among Iranian Mandaeans. It has been shown that consanguinity significantly increases the prevalence of inherited autosomal recessive diseases and many multifactorial traits such as infertility, congenital disorders, and mental retardation (Bittles *et al.*, 1993; Bittles & Neel, 1994; Stoltenberg *et al.*, 1999; Bittles, 2001; Saadat & Zendehe-Boodi, 2006; Saadat, 2008a; Tadmouri *et al.*, 2009; Mansour *et al.*, 2010; Saadat & Vakili-Ghartavol, 2010; Nafissi *et al.*, 2010, 2011; Anvar *et al.*, 2011; Saadat, 2011, 2015a). The harmful consequences of consanguineous mating emphasize the need for genetic counselling in the Mandaean community and the importance of preventive action to raise awareness about the risks of consanguinity.

Acknowledgments

The authors are indebted to the study participants for their close co-operation. They also thank Mr Salam Choheili (Great Leader of the Iranian Mandaean) for his support. They are also grateful to Dr Maryam Ansari-Lari for her contribution in revising and editing the manuscript. The study was supported by Shiraz University, Iran (94GRD1M1741). The authors have no conflicts of interest to declare.

References

- Akrami, S. M & Osati, Z. (2007) Is consanguineous marriage religiously encouraged? Islamic and Iranian considerations. *Journal of Biosocial Science* **39**, 313–316.
- Alper, O. M., Erengin, H., Manguoglu, A. E., Bilgen, T., Cetin, Z., Dedeoglu, N. & Luleci, G. (2004) Consanguineous marriages in the province of Antalya, Turkey. *Annales de génétique* **47**, 129–138.

- Amirshahi, P., Sunderland, E., Farhud, D. D., Tavakoli, S. H., Daneshmand, P. & Papiha, S. S. (1992) Population genetics of the peoples of Iran I. Genetic polymorphisms of blood groups, serum proteins and red cell enzymes. *International Journal of Anthropology* **7**, 1–10.
- Anvar, Z., Namavar-Jahromi, B. & Saadat, M. (2011) Association between consanguineous marriages and risk of pre-eclampsia. *Archives of Gynecology and Obstetrics* **283**(Supplement 1), 5–7.
- Benallegue, A. & Kedji, F. (1984) Consanguinité et santé publique: étude algérienne. *Archives Francaises de Pediatrie* **41**, 435–440.
- Bittles, A. H. (2001) Consanguinity and its relevance to clinical genetics. *Clinical Genetics* **60**, 89–98.
- Bittles, A. H., Grant, J. C. & Shami, S. A. (1993) An evaluation of consanguinity as a determinant of reproductive behaviour and mortality in Pakistan. *International Journal of Epidemiology* **22**, 463–467.
- Bittles, A. H. & Neel, J. V. (1994) The costs of human inbreeding and their implications for variations at the DNA level. *Nature Genetics* **8**, 117–121.
- Buckley, J. J. (2002) *The Mandaeans: Ancient Texts and Modern People*. First edition. Oxford University Press, New York.
- COSIT (2006) *Iraq Living Conditions Survey 2004: Vol. II: Analytical Report*. Central Organization for Statistics and Information Technology (COSIT), Ministry of Planning and Development Cooperation, Baghdad.
- El-Kheshen, G. & Saadat, M. (2013) Prevalence of consanguineous marriages among Shi'a populations of Lebanon. *Journal of Biosocial Science* **45**, 675–682.
- Fallahzadeh-Abarghoeei, L., Zahedi, T., Mirabedi, F. & Saadat, M. (2015) Allelic prevalence of intron 3 insertion/deletion genetic polymorphism of DNA double-strand break repair gene *XRCC4* in four healthy Iranian populations. *Egyptian Journal of Medical Human Genetics* **16**, 215–218.
- Hafez, M., El-Tahan, H., Awadalla, M., El-Khayat, H., Abdel-Gafar, A. & Ghoneim, M. (1983) Consanguineous matings in the Egyptian population. *Journal of Medical Genetics* **20**, 58–60.
- Hamamy, H., Jamhawi, L., Al-Darawsheh, J. & Ajlouni, K. (2005) Consanguineous marriages in Jordan: why is the rate changing with time? *Clinical Genetics* **67**, 511–516.
- Khoury, S.A. & Massad, D. (1992) Consanguineous marriage in Jordan. *American Journal of Medical Genetics* **43**, 769–775.
- Mansour, H., Fathi, W., Klei, L., Wood, J., Chowdari, K., Watson, A. *et al.* (2010) Consanguinity and increased risk for schizophrenia in Egypt. *Schizophrenia Research* **120**, 108–112.
- Nafissi, S., Ansari-Lari, M. & Saadat, M. (2010) Effect of inbreeding on weight gain of offspring from birth to 12 months after birth, a study from Iran. *Journal of Biosocial Science* **42**, 195–200.
- Nafissi, S., Ansari-Lari, M. & Saadat, M. (2011) Parental consanguineous marriages and age at onset of schizophrenia. *Schizophrenia Research* **126**, 298–299.
- Othman, H. & Saadat, M. (2009) Prevalence of consanguineous marriages in Syria. *Journal of Biosocial Science* **41**, 685–692.
- Rafiee, L. & Saadat, M. (2011) Prevalence of consanguineous marriages among Iranian Georgians. *Journal of Biosocial Science* **43**, 47–50.
- Rafiee, L., Saadat, I. & Saadat, M. (2010) Glutathione S-transferase genetic polymorphisms (*GSTM1*, *GSTT1* and *GSTO2*) in three Iranian populations. *Molecular Biology Reports* **37**, 155–158.
- Saadat, M. (2007) Consanguinity marriages in Iranian folktales. *Community Genetics* **10**, 38–40.
- Saadat, M. (2008a) Consanguinity and national IQ. *Journal of Epidemiology and Community Health* **62**, 566–567.
- Saadat, M. (2008b) Is consanguineous marriage historically encouraged? *Journal of Biosocial Science* **40**, 153–154.

- Saadat, M.** (2011) Association between healthy life expectancy at birth and consanguineous marriages in 63 countries. *Journal of Biosocial Science* **43**, 475–480.
- Saadat, M.** (2015a) Age-standardized incidence rates for leukemia associated with consanguineous marriages in 68 countries, an ecological study. *Mediterranean Journal of Hematology and Infectious Diseases* **7**, e2015027.
- Saadat, M.** (2015b) Distribution of *ACE* insertion/deletion (I/D) polymorphism in Iranian populations. *Molecular Biology Research Communications* **4**, 63–66.
- Saadat, M., Ansari-Lari, M. & Farhud, D. D.** (2004) Consanguineous marriage in Iran. *Annals of Human Biology* **31**, 263–269.
- Saadat, M. & Tajbakhsh, K.** (2013) Prevalence of consanguineous marriages in west and south of Afghanistan. *Journal of Biosocial Science* **45**, 799–805.
- Saadat, M. & Vakili-Ghartavol, R.** (2010) Parental consanguinity and susceptibility to drug abuse among offspring, a case-control study. *Psychiatry Research* **180**, 57–59.
- Saadat, M. & Zendehebodi, Z.** (2006) Correlation between incidences of self-inflicted burns and means of inbreeding coefficients, an ecological study. *Annals of Epidemiology* **16**, 708–711.
- Saha, N. & El Sheikh, F. S.** (1988) Inbreeding levels in Khartoum. *Journal of Biosocial Science* **20**, 333–336.
- Saify, K. & Saadat, M.** (2012) Consanguineous marriages in Afghanistan. *Journal of Biosocial Science* **44**, 73–81.
- Shawky, R. M., El-Awady, M. Y., Elsayedm, S. M. & Hamadanm, G. E.** (2011) Consanguineous matings among Egyptian population. *Egyptian Journal of Medical Human Genetics* **12**, 157–163.
- Stoltenberg, C., Magnus, P., Skrondal, A. & Lie, R. T.** (1999) Consanguinity and recurrence risk of stillbirth and infant death. *American Journal of Public Health* **89**, 517–523.
- Tadmouri, G. O., Nair, P., Obeid, T., Al Ali, M. T., Al Khaja, N. & Hamamy, H. A.** (2009) Consanguinity and reproductive health among Arabs. *Reproductive Health* **6**, 17.
- Tuncbilek, E. & Koc, I.** (1994) Consanguineous marriage in Turkey and its impact on fertility and mortality. *Annual Human Genetics* **58**, 321–329.