THE IMPACT OF CONSANGUINITY ON FETAL LOSS

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SUMMARY: The effect of consanguinity on fetal loss and mortality and morbidity of offspring is the subject of controversy. We carried out a retrospective cross sectional study on 469 couples with fetal loss, among whom 237 (50.53%) couples had consanguineous union and 232 (49.47%) of couples had no consanguinity. Considering the prevalence of consanguinity in the population that is 23%, a relation between consanguinity and fetal loss can be elucidated, although for more accurate determination of this correlation we need to find the prevalence of consanguinity in couples with no history of fetal loss, i.e., designing a case control study.

Key words: Consanguinity, fetal loss.

INTRODUCTION

Consanguinity is marriage between relatives who share at least one common and detectable ancestor. The effect of consanguinity on mortality and morbidity is the subject of controversy (1-5). Many studies carried on to survey morbidity (6,7) and mortality (1, 8, 9) among the offspring of consanguineous couples, which revealed an increased risk.

Saad and Jauniaux could not find any relationship between recurrent miscarriage and consanguinity in Qatari population (10). And also some studies could not find any association between consanguinity and offspring mortality (11-13). On the other hand, some studies have shown an association between consanguineous marriage and spontaneous abortion and intrauterine loss (14-16).

In a study on Utah Mormon population, Jorde has shown that 13.2% of the offspring of unrelated parents died before the age of 16 years, whereas this figure for the offspring of first-cousin marriages was 22% (relative risk of 1.7) and for the offspring of closer unions was 32% (relative risk of 2.41) (17).

MATERIALS AND METHODS

The survey carried on couples with fetal loss referred to genetics department of Urmia University of medical sciences.

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Table 1: Type of consanguinity and coefficient of consanguinity among related couples.

Type of consanguinity	Cc or F	No. of couples	%
Parallel patrilineal first cousins	1/16 (0.0625)	44	18.56
Parallel matrilineal first cousin	1/16 (0.0625)	65	27.43
Anti-parallel first cousins	1/16 (0.0625)	72	30.38
First cousins once removed	1/32 (0.03125)	30	12.66
Double first cousins	1/8 (0.125)	2	0.84
Second cousins	1/64 (0.015625)	24	10.13
Total		237	100

During last two years 469 couples were referred to genetics department due to fetal loss with unknown reason. Of 469 couples 237 (50.53%) had consanguineous union and 232 (49.47%) were unrelated.

Coefficient of inbreeding (F) was calculated using standard methods (18), i.e., via the general equation $FI = \Sigma (1/2)^{p+m+1} (1+FA_i)$ and then averaged for the total consanguineous marriages (α), using the equation $\alpha = \Sigma F_i f_i$ where f_i is the frequency of the subjects with consanguinity F_i.

RESULTS

Considering coefficient of consanguinity equal or greater that 1/64 as the border of clinically important consanguinity, of 469 couples 237 had consanguineous union and 232 had no consanguinity. The coefficient of consanguinity (Cc or F) among 237 couples has been shown in Table 1.

Using the equation $\alpha = \Sigma F_i f_i$ the average coefficient of consanguinity for the consanguineous group is approximately 5.43% or 1/18.4. Although the equation $\alpha = \Sigma F_i f_i$ is generally used for calculation of consanguinity of a population, we used it for calculation of consanguinity of a group.

DISCUSSION

Marriage between close relatives seems to be critical from genetics point of view, because closely related couples have an increased probability of carrying the same alleles than less closely related or unrelated couples. Then, the offsprings of a consanguineous couple are more likely to be homozygous for a given allele. Since homozygosity for genes with mutations is deleterious (19), then consanguineous union would be deleterious for offspring. However as mentioned in the introduction section according to the literature, the deleterious effect of consanguinity on the concepti and offspring is the subject of controversy. Additionally, the effects of environmental factors make the issue too complicated to reveal the possible linkage between consanguinity and offspring mortality. Then the effect of consanguinity on offspring mortality remains unclear. In this regard, we carried out a retrospective cross sectional study on 469 couples with fetal loss who referred to our department during the last 2 years. Of 469 couples 244 had consanguineous union and 225 had no consanguinity, and of 244 consan-

guineous couples 7 had coefficient of consanguinity less than 1/64. Considering the recommendation of WHO we grouped these 7 couples in the group of non-sanguinity. Then total number of consanguineous couples is 237 (50.53%) and of non-consanguineous couple is 232 (49.47%). In this study coefficient of consanguinity used to separate the border of consanguinity and non-consanguinity. Coefficient of consanguinity is the probability that the two alleles at a locus are identical by descent (IBD), and being IBD defines the situation of consanguinity for a subject. In this study the number of couples with consanguinity (with average coefficient of consanguinity 1/18.4) was 237 (50.53%) and of couples with non-consanguinity was 232 (49.47%). However the prevalence of consanguineous marriage in this society should be taken into consideration. In a study we found that the prevalence of consanguinity in the population from which the samples are chosen is 23%. It means that although the consanguineous population consists less than 1/4 of general population, they have approximately the same percentage of couples with fetal loss. It is obvious that for accurate determination of this correlation it is necessary to design a case control study to determine the prevalence of consanguinity in couples with no history of fetal loss. Since referred couples have the same socioeconomic background, we did not consider any socioeconomic factors to be applied. As in a case-control study consisting of consanguineous males and their non-consanguineous brothers revealed that the case-control matching had little effect on the result (17). Jorde has revealed an increased risk for pre-reproductive mortality; i.e., death occurring before age 16 years, among the offspring of first-cousin marriages and of closer unions with relative risks of 1.7 and 2.41 respectively (17). Since this matching procedure was designed to choose samples from the same socioeconomic backgrounds, it can be concluded that the socioeconomic status was not a significant confounding factor in the population under study.

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