

Original Article

Evaluation of chromosomal changes in patients with spontaneous abortion in Khozestan province

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ABSTRACT

Objective: Approximately 15-20% of clinically recognizable pregnancies end in spontaneous abortion. The incidence of chromosomal abnormalities in those abortions is as high as 50%. A modest but clinically important proportion of spontaneous abortions is caused by a balanced chromosomal aberration in one of the parents. This results from the production of gametes and embryos with unbalanced chromosome sets. The clinical consequences of such abnormal gametes include sterility, recurrent abortions, and giving birth to malformed children. Until now, no such studies have been done in Khozestan province. Therefore, the purpose of this study was to evaluate the frequency and nature of chromosomal abnormalities that lead to recurrent abortions in Khozestan province, which should help physicians working in the region to realize the contribution of chromosomal abnormalities to cases of repeated fetal loss. Also it compares our region to other countries and research centers. This research study evaluated 142 cases with repeated abortion during 1-year period of the study. Methods and

Materials and methods: For routine cytogenetic analysis, 3 ml of peripheral blood was incubated in complete lymphocyte culture medium and colchicine was added at prophase stage for fixing chromosomes. Then, they were categorized by G-banding method.

Results: A total of 116 cases with a history of recurrent abortions were examined in this research study. The age of the referred women ranged from 20 to 43 years with an average of 28 years (SD = 4.75). Meanwhile, the age of referred men ranged from 22 to 44 years and with an average of 32.8 years (SD = 4.86). The number of previous abortions varied from 2 to 5 abortions (an average of 2.82 abortions per case).

In addition, 8 females (12.7%) and 6 males (11.3%) were found to have abnormal karyotypes. These abnormalities were four balanced translocations, one deletion, one inversion and eight mosaic condition. Among cases with abnormal karyotype, the average of maternal age was 29 years (SD = 3.25). Meanwhile, the average number of abortions for cases with abnormal karyotype was 3.07 (SD = 0.83).

Conclusion: The correlation for maternal age and chromosomal abnormality was $P=0.083$ and for the number of abortions and chromosomal abnormality was $P=0.107$.

Key words: Cytogenetic, Recurrent abortion, Chromosomal abnormality

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Introduction

Chromosomal abnormalities comprise a major group of genetic disorders (1). These aberrations are responsible for a large part of abortions, malformations, mental retardness, and malignancies. Genetic abnormalities of the cell are observed in 1% and 2% of pregnancies giving birth to live infant and in women with an age above 45 years and they are involved in 50% of spontaneous abortions in first trimester of pregnancy (2-3). Except for germinal cells, all human cells contain 46 chromosomes including 22 autosomal pairs and one sex pair (XX or XY). For clinical analysis of chromosomes, the related cell should be capable of rapid growth and division in culture medium. The most appropriate cell for this purpose is blood cells, especially lymphocytes. Chromosomal abnormalities are evaluated in disorders including deceased infants with abnormal growth and development, infant death, fertility issues in women, and malformations. Chromosomal abnormalities may involve a change in the number of chromosomes and changes in their morphology and size and may be transmitted from parents to offspring. In addition, these abnormalities may include some kinds of mutations.

Abortion is defined as pregnancy termination due to any causative factor before 20th week. An abortion with no involvement of a physician is defined as spontaneous which comprise nearly 12% and 26% of pregnancies under and above 20 years. In addition, the occurrence of two or more spontaneous abortions is defined as recurrent which may be as a result of chromosomal abnormalities, endocrine and immune disorders, and/or infectious conditions. The incidence

of recurrent abortion irrespective of previous abortions is 25-30% and this condition is associated with a higher rate of chromosomal abnormalities (4-5).

Material and Methods

In this research study, referrals for karyotyping with a history of abortion were studied during 1 year. They were 142 men and women, among whom 116 cases with spontaneous abortion (2 or more) were evaluated. Out of them, 63 cases were female and 53 cases were male. In addition, women and men were at an age range of 20-40 and 22-44 years respectively. Then, 3 ml of blood was collected and added to lymphocyte growth medium and at prophase stage, colchicine was added to stop mitosis and chromosomes were studied using G-banding method.

Results

A total of 116 cases with a history of recurrent abortions were examined in this research study. The age of the referred women ranged from 20 to 43 years with an average of 28 years (SD = 4.75). Meanwhile, the age of referred men ranged from 22 to 44 years and with an average of 32.8 years (SD = 4.86). The number of previous abortions varied from 2 to 5 abortions (an average of 2.82 abortions per case). In addition, 8 females (12.7%) and 6 males (11.3%) were found to have abnormal karyotypes. The female/male ratio for chromosomal abnormality was 1.32/1. On the other hand, the correlation for maternal age and chromosomal abnormality was $P=0.083$ and for the number of abortions and chromosomal abnormality was $P=0.107$. (table 1)

Table 1 .Cytogenetic finding parity , number of abortion, maternal age

Karyotype	parity	NO of abortion	Maternal age
46xx,16H+,21S+	1	2	32
46xx,14P+	0	3	28
46XX,Var,15P	0	3	32
46XX,20q+,11,22	0	2	28
46XX/47XXX(12Y0/45,XO(12Y)	0	4	30
46XX91%	0	4	29
46XX,15PSp	1	2	31
46XX/46XX,22q	0	2	22

Discussion

Cytogenetic evaluation is required for diagnosis of chromosomal abnormalities regarding spontaneous abortion in addition to analysis of other causative factors including infections and immune-related problems. Schmidt (1962) was the first researcher to report the possibility of chromosomal abnormality in patients with abortion and its incidence was reported as 0-21.4% (6). Thereafter, other studies were conducted to determine the incidence and nature of chromosomal abnormality in related couples (7).

The highest incidence of spontaneous abortion was 12.1% in women at an age range of 26-34 years and in men at an age range of 32-34 years, which is attributed to higher reproductive condition in these age periods. The results of Spearman correlation analysis showed a correlation coefficient equal to 0.107 for association between chromosomal abnormalities and abortion. This coefficient is 0.05 in Saudi Arabia (8), which is one fourth of our country. Meanwhile, the correlation for maternal age and chromosomal abnormality was $P=0.081$ and there is no such data for Saudi Arabia. There was also a greater correlation (1.5 fold) for chromosomal abnormality than maternal age and such abnormalities.

To conclude, chromosomal abnormality is one of the main causative factors for spontaneous abortion and this association is higher as maternal

age increases. Therefore, cytogenetic tests are recommended for patients with a history of abortion, especially in women with a higher age to identify chromosomal modification. (Table 2)

presents the related data showing the role of different chromosomal abnormalities in spontaneous abortion in different countries (9-12).

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Table 2 .chromosomal abnormalities in women with a history of abortion in different country

site	NO	Robertsonian	Reciprocal	Inversion	Other	Number	%
Spain (Barcelona)	32	1	3	1	1	6	%17
Japan	639	9	19	1	-	29	4.5
Switzerland	96	2	4	-	1	7	7.3
Netherlands(Leiden)	67	3	5	1	-	9	13.4
France(Strasborug)	217	4	-	2	-	6	2.8
France (Paris)	315	5	7	4	-	16	5.1
Italy	145	4	4	4	2	12	9.6
Saudi Arabia	193	1	10	2	-	13	6.7
Belgium	96	2	6	-	-	8	8.3
Netherland(Rotterdam)	148	3	6	3	2	14	9.6

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