



## CYTOGENETIC ANALYSIS OF COUPLES WITH REPEATED SPONTANEOUS ABORTIONS

V. Petrova-Tacheva<sup>1\*</sup>, S. Alekova<sup>2</sup>, B. Popov<sup>1</sup>, V. Ivanov<sup>3</sup>

<sup>1</sup>Department of Molecular Biology, Immunology and Medical Genetics, Medical Faculty, Trakia University, Stara Zagora, Bulgaria

<sup>2</sup>Department of General Medicine and Ophthalmology, Medical Faculty, Trakia University, Stara Zagora, Bulgaria

<sup>3</sup>Department of Chemistry and Biochemistry, Medical Faculty, Trakia University, Stara Zagora, Bulgaria

### ABSTRACT

**PURPOSE:** The objectives of the study were to determine, compare and analyze the incidence and distribution of chromosomal abnormalities in couples with recurrent miscarriage from South-East Bulgaria. **MATERIALS AND METHODS:** In the group studied there were altogether 78 married couples (156 individuals) with a history of at least two or more spontaneous abortions. Both partners were karyotyped as part of the primary investigation. **RESULTS:** The chromosome aberrations were registered in 1.9% of all cases included. Ascertained was four times higher carrying frequency of balanced chromosome translocations. Chromosome polymorphism carrying of the major acrocentrics was almost four times higher. **CONCLUSION:** All these results confirm the important part of these finds in the etiology of the recurrent miscarriages but determination of their specific role requires more complete and thorough investigations.

**Key words:** spontaneous abortion, cytogenetics, chromosomal aberration

### INTRODUCTION

Recurrent abortions continue to be difficult problems for the patient and clinician. Possible causes of recurrent abortions were genetic, anatomical, endocrine, immune, infectious and other (1). It is known that in 2-5% of families with several unsuccessful pregnancies was detected balanced chromosomal rearrangements (translocation or inversion) in one of the partners. Carriage of such chromosomal rearrangements is associated with an increased risk not only for recurrence of abortion, but also with increased risk of birth of a disabled child (2).

### PURPOSE

The objectives of the study were to determine, compare and analyze the incidence and

distribution of chromosomal abnormalities in couples with recurrent miscarriage from South-East Bulgaria.

### MATERIALS AND METHODS

For this study were used the data and results of the 78 couples (general 156 individuals) with a history of repeated abortions, tested in the Laboratory of Cytogenetic in Department of Molecular Biology, Immunology and Medical Genetics of the Medical Faculty of Trakya University. In addition to the history of repeated abortion, some had a history of stillbirth or of having a child with multiple congenital anomalies or congenital heart defect.

The couples were from South-East Bulgaria (region of Stara Zagora, Haskovo, Sliven and Jambol). The mean age of all surveyed women was 29 years and 1 month and the mean age of the males was 30 years and 6 months.

Both partners were karyotyped as part of the primary investigation. Cytogenetic analysis was carried out with preparations, made from

\*Correspondence to: Dr. Veselina Petrova-Tacheva, Department of Molecular Biology, Immunology and Medical Genetics, Faculty of Medicine, Trakia University, Armeiska 11, 6000 Stara Zagora, Tel.:042/664311, Mobile: 0896056412, e-mail:vesepetr@abv.bg

peripheral lymphocyte cultures and was performed by GTG-banding. Eleven metaphases

were systemically studied and if any mosaicism was suspected, the number of analyzed metaphases was increased to hundred.

**Table 1.** The number of abortion in couples.

Number of abortion	Number of couples	Percentage
2 abortions	59	75.6%
2 abortions and 1 stillbirth	1	1.3%
2 abortions and 1 child with multiple congenital anomalies	1	1.3%
3 abortions	12	15.4%
4 abortions	2	2.6%
4 abortions and 1 child with congenital heart disease.	1	1.3%
5 abortions	2	2.6%
Total	78	100%

In a part of the surveyed couples (in 64 pairs) are marked the polymorphic variants (if were established) of Y chromosome or of satellite polymorphism of the acrocentric chromosomes.

**RESULTS AND DISCUSSION**

It was found that 153 individuals of the study group were with normal karyotypes. In the remaining three cases were identified the following chromosomal rearrangements given in **Table 2.**

**Table 2.** Detected chromosomal aberrations in the studied group.

Types of chromosomal rearrangements	Incidence	Karyotypes
Balanced translocations	2	46, XX, t(22;9) 46, XX, t(4;11)(p16;q25)
Inversions	1	46,XY, inv(9)(p11;q13)

The total frequency of all chromosomal aberrations in the group was 1.9%. Based on a study in Bulgaria the ungraded group of 3000 newborns was found that carriers of balanced structural aberrations are 0.66% (3). We established an almost threefold increase. The frequency of cytogenetic abnormalities in other studies varied between 0 and 4.7%, probably due to difference in selection and referral of patients for cytogenetic examination (4). We found 2 cytogenetic abnormalities in females and 1 in males. Chromosome aberrations were more frequent in the women than in their husbands. That is was found also in numerous other studies (4-10). A likely explanation is that chromosomal aberrations in male carriers may cause severe meiotic disturbances and spermatogenic arrest (4, 6, 8).

The incidence of balanced translocations in the general population is 0.2-0.3% (10, 11). The incidence of balanced translocations we found is 1.28%. This determined incidence is four times greater than in the general population. The reported incidence of balanced chromosomal translocations in couples with a history of multiple spontaneous abortions ranges from 0% to 31%. The reason for this wide variation is not clear (10).

Chromosome variants or polymorphisms are microscopically visible regions that vary in size, morphology and staining properties and have no apparent effect on the phenotype. They are inherited in a Mendelian fashion and are mostly found in the highly variable regions of chromosomes 1, 9, 16, the distal two thirds of

the long arm of the Y chromosome and the short arms and satellites of the acrocentric chromosomes (12, 13). The frequency of the polymorphisms of major acrocentric chromosomes is defined as 2.34% with a standard stain (14). In the our study, the polymorphism of major acrocentric chromosomes was determined as 9,4%. We established fourfold increase in the this find. The frequency/incidence of the polymorphism of minor acrocentric chromosomes is defined 1.6-1.8% with a standard stain and banding techniques (14). In the our study, the satellite polymorphism of minor acrocentric chromosomes was determined as 1.56%. The incidence of major Y variants was increased among the study group – 10.9%. Studies in Bulgaria show that large variations of Y variants is about 6% (13). Interpretation of this our results requires more complete and thorough investigations.

### CONCLUSIONS

All obtained results confirm the importance of these finds in the etiology of the recurrent miscarriages but determination of their specific role requires more complete and thorough investigations.

Also the cytogenetic analyses should be recommended in couples with recurrent abortions because the cytogenetic results could provide important information for their genetic counselling and future genetic prevention.

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