RESEARCH NOTE

Double trisomy with 48, XXX+21 karyotype in a Down's syndrome child from Jammu and Kashmir, India

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Introduction

An 11-day-old female child, the third in birth order of a nonconsanguineous couple, was found to have a double trisomy (48, XXX+21) upon karyotyping. The proband has the typical Down's syndrome phenotype and the same was attributed to trisomy-21.

The occurrence of double aneuploidy is a relatively rare phenomenon in human (MacFaul *et al*. 1981; Cyrus *et al*. 2005). Most reported cases of double aneuploidy are presented in the form of spontaneous abortions. The reported cases involving autosome and/or sex chromosome aneuploidy, such as double autosomal trisomy and autosomal trisomy with sex chromosome monosomy or trisomy, are extremely rare in live newborns (MacFaul *et al*. 1981; Reddy 1997). The patient with double aneuploidy may have manifestations of both chromosomal abnormalities. Double aneuploidy that leads to trisomy and/or monosmy of the two different chromosomes arises because of two meiotic nondisjunctional events (Lorda-Sanchez *et al*. 1991; Park *et al*. 1995; Cyrus *et al*. 2005). However, in human, monosomy of chromosomes other than sex chrmosomes is virtually nonexistent, presumably due to incompatibility of autosomal monosomies at an early stage of gestation (Hassold and Jacobs 1984). However, trisomy is the most commonly identified chromosomal abnormality in humans occurring in at least 4% of all clinically recognised pregnancies (Hassold and Jacobs 1984). The vast majority of trisomies are associated with a single additional chromosome, although two other types of trisomic conceptions are occasionally observed, namely, those with two additional chromosomes or double trisomies, and those with either normal and trisomic-cell lines or mosaic trisomies (Hassold and Jacobs 1984). Double trisomy i.e., +21 and triple-X could have a same or different parental origin (Park *et al*. 1995; Cyrus *et al*. 2005). The coincidence rate of both trisomy-21 and triple-X in the same individual is very low as compared to trisomy-21 (Papp *et al*. 1977; Verma *et al*. 1979; Cyrus *et al*. 2005). Trisomy-21 and triple-X in the same individual have been reported earlier (Breg *et al*. 1962; Upadhyaya and Verma 1975; Papp *et al*. 1977; Verma *et al*. 1979; Park *et al*. 1995; Devlin and Morrison 2004). Present report of double trisomy in a clinical Down's syndrome case is an addition to the existing literature.

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Case history

An 11-day-old female infant with a clinical symptoms of Down's syndrome (figure 1) was taken up for chromosome study. She was third in birth order of a nonconsanguineous couple. At the time of the child's birth the mother was 35 years old and father was 37 years old. The proband was born 10 years after the second child. The proband had mongoloid face, flat nasal bridge, smaller mid-phalynx of short finger, unilateral simian crease on right palm, thick furrowed tongue, low set ears, open mouth and gap between the first and second toes.

Cytogenetic study

Chromosomal study carried on the proband showed 48 chromosomes in every well-spread G-banded metaphase plate. Some of these G-band metaphase plates were karyotyped. Every karyotype thus prepared showed two trisomies viz. trisomy-21 and triple-X (figure 2).

Discussion

A rare case of double chromosome aneuploidy including Down's syndrome (trisomy-21) and triple-X was described.

Keywords. human karyotyping; Down's syndrome; triple-X; double trisomy.

Figure 1. Phenotype of the proband.

The proband had features typical of Down's syndrome and chromosome study showed 48, XXX+21 karyotypes i.e. the child had double trisomy. Study of the existing literature shows the rate of both Down's syndrome and triple-X in the same individual to be far lower than trisomy 21 alone. Double trisomy involving X-chromosome and chromosome number 21 have earlier been reported by Papp *et al*. (1977), Verma *et al*. (1979), Park *et al*. (1995) and Devlin and Morrison (2004), and our findings in the proband are similar to the previous reports and an addition to the existing literature.

Most cases of double aneuploidies in liveborns involve the sex chromosomes combined with trisomy 13, 18 or 21 (Hou and Wang 1996). Both aneuploidies arise as a result of nondisjunction in maternal meiosis II (Park *et al*. 1995) and these results support the hypothesis that a segregation defect at the cellular level may cause nondisjunction involving more than one chromosome. The present case is an isolated one in the family, as she is the third in birth order and both the first two offspring of the couple are normal. The additional X chromosome may have come from either the maternal or

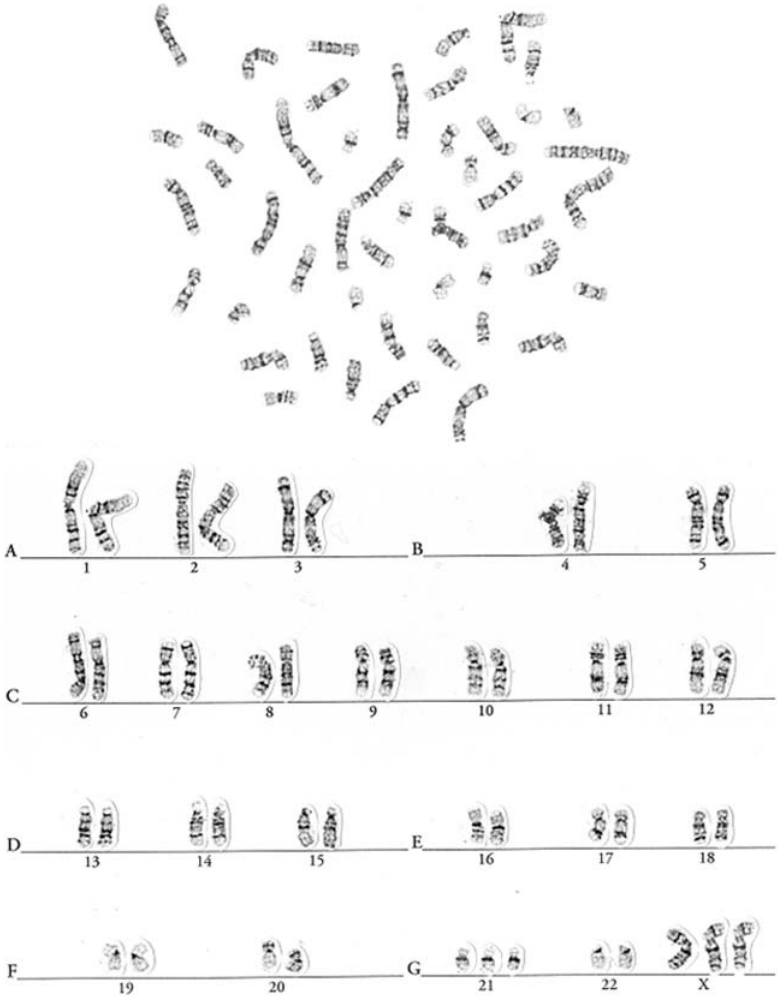

Figure 2. Chromosome complement ($2n$ = 48) and karyotype (48, XXX+21) of the proband.

paternal side. However, trisomy-21 has typically been correlated with the advanced maternal age (Verma *et al*. 1979; Kothare *et al*. 2002). In the present study, the maternal age is 35 years and is likely a cause of the nondisjunction of chromosome number 21.

The present case, and most of the published reports on 48, XXX+21, have shown features typical of Down's syndrome alone (Verma *et al*. 1979; Papp *et al*. 1977; Park *et al*. 1995). Further reports of double aneuploidy of trisomy-21 and triple-X highlighting the clinical characteristics will aid in a better understanding of the phenotype–genotype relationship.

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