Original Article

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Cytogenetic Evaluation of Infertile Couples in Manipur

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Abstract

Purpose: This study was conducted to determine the frequency and contribution of chromosomal abnormalities in couples presenting with infertility in the state of Manipur. *Materials and Methods:* Study was done on 23 infertile couples (23 male and 23 female) making a total of 46 cases. Chromosomal analysis from peripheral blood lymphocytes was performed according to standard cytogenetic methods using G-banding technique. *Results:* Among the males, chromosomal abnormalities were found in 3 (13%) cases i.e, 2(8.6%) cases with 47,XXY (Klinefelter syndrome) and 1 (4.3%) case with 47,XYY syndrome. All the remaining males showed normal karyotype 46,XY . Among the females, all the karyotype shows a normal female karyotype i.e, 46,XX. *Conclusions:* This study may be indicative that chromosomal abnormalities are common among the males with infertility which included Klinefelter Syndrome and XYY syndrome. Cytogenetic analysis could be valuable for these couples when clinical data fail to clarify the cause.

Keywords: Cytogenetic analysis; Infertile.

Introduction

Infertility is a global problem. It is defined as absence of pregnancy after one year of unprotected intercourse and with this definition, the prevalence has been estimated to be 10-15% [1]. In 2007, the prevalence of infertility is approximately 9% [2]. Infertility affects about 15 percent of allcouples attempting pregnancy [3]. According to WHO, 50-80 million people in the world are facing the problem of getting an integrated family and in India, it is estimated to be 15-20 million [4]. It can be speculated that in about 15% of male and 10% of female infertile subjects, genetic abnormalities could be present [5].

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Research on genetic causes of male and female infertility has rapidly expanded in the last years, following the development of Assisted Reproductive techniques.

Causes of infertility are numerous. Male factors contribute about 40%, female factors about 40% and both male and female factors are found in 20% of the cases [6]. While chromosomal or genetic abnormalities associated with azoospermia, severe oligospermia or primary ovarian failure were of no importance prior to the era of in vitro fertilization (IVF) and intracytoplasmic sperm injection (ICSI), advances in assisted reproduction techniques (ART) now enables many infertile couples to have children. To prevent the genetic risk for the future child, cytogenetic screening of both partners is mandatory prior to any type of ART [7].

The general causes of infertility in female may be tubal blockage, pelvic and cervical factors , ovarian and uterine factors [8]. The genetic causes of female infertility may be whole X chromosome deletionseg, Turner Syndrome, X-chromosome microdeletions, X chromosome-autosome translocationsor single gene disorders like the diaphanous gene, FMR1 gene, FSHR gene, LH/HCGR gene, the CYP17 gene etc. WHO recommends that all infertile males should undergo semen analysis in addition to

measurements of hormones [9]. In less than 5 million sperms per milliliter, the incidence of chromosomal abnormality is 4% [10]. Based on the frequencies of chromosomal aberrations in patient with different sperm concentration, karyotype analysis is indicated in azoospermic men and in oligospermic men with less than 5million sperms per milliliter [11].

The general causes of male infertility includes varicocele, cryptorchidism, ejaculatory dysfunction, sexual dysfunction, testicular failure, cancer, heat and radiation [12]. Genetic causes may be chromosomal aberrations, microdeletions and single gene disorders [13].

They include Klinefelter Syndrome, XYY Syndrome, XX male, mixed gonadal dysgenesis, Y-chromosome structural abnormalities, sex chromosomal reciprocal translocation, Robertsonian translocation, Reciprocal translocation, supernumerary marker chromosomes and ring chromosomes [12]. Microdeletions of the long arm of the Y chromosome are found in approximately 13% of azoospermic men [12]. The aim of the present study is to find out the chromosomal abnormalities in infertile males and females in Manipur.

Materials and Methods

The study was a cross-sectional study done in the Department of Anatomy, Regional Institute of Medical Sciences, Imphal for a duration of 2 years. A total of 46 cases were studied who attended RIMS-OPD which included infertile patients with suspected genetic abnormalities and excluded couples with known causes of infertility. The mean age among the males was 38.5 years and among the females was 29.5 years. A formal permission was sought from the Institutional Ethics Committee of the college. Informed consent was taken from the patients and their data collected. New suspected cases prevailing for the last one and a half years were taken and karyotyping was carried out. Sample size were calculated by using the formula $n=4pq/L^2$ (p=prevalence, q= 100-p) taking p=3% and allowable error of 5% of p. Peripheral blood from these cases were collected and lymphocyte tissue culture were done for about 48-72 hours. 15-20 metaphases were examined under trinocular research microscope, the best metaphases were selected, photographed, printed and karyotypes were prepared. The chromosomes of these patients were examined for any structural or numerical anomalies.

Results and Observations

A total of 46 cases were examined and evaluated. Among the males, 3 (13%) shows abnormal karyotype i.e, 2 (8.6%) cases with 47, XXY (Klinefelter syndrome) (Figure 1) and 1 (4.3%) case with 47, XYY syndrome (Figure 2). All the remaning females

Table 1: Karyotype of the patients

Sex	Normal Karyotype (46,XY)	Abnormal Karyotype	Total
Male	20	3 (2 with 47,XXY; 1with 47,XYY)	23
Female	23	0	23

Fig. 1: Karyogram showing 47, XXY karyotype

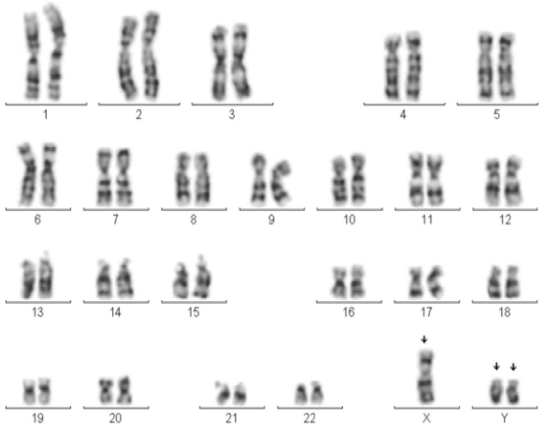

Fig. 2: Fig Chromosome analysis (GTG- banding) revealed karyotype with an extrachromosome Y ie 47, XYY pattern in all the cells analysed

Fig. 2.1: Metaphase spread of female chromosomes

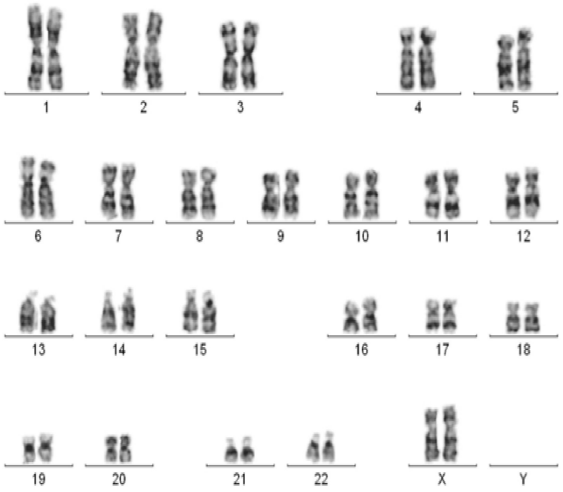

Fig. 3: Metaphase spread of Male chromosomes

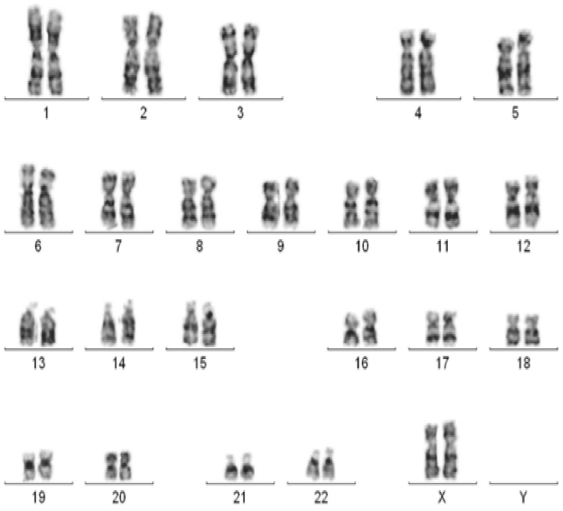

Fig. 4: Karyogram showing normal male karyotype 46,XY

showed normal karyotype, 46, XX (Figure 3). Among the males, all the karyotype shows a normal male karyotype i.e, 46, XY (Figure 4).

Discussion

In the present study, a total of 23 couples (46 cases) were diagnosed with primary infertility i.e. absence of pregnancy after one year of unprotected intercourse, with unknown cause of infertility, with no previous issue, no family history of infertility and consented to participate in the study procedures were done peripheral blood karyotyping. Infertility is associated with an increased frequency of chromosome anomalies with Klinefelter syndrome being the commonest [14]. Mau UA et al. [15] reported chromosomal abnormalities in 18% of their study population of which males constitute 12% and females 6%. Meschede D et al. [16] also reported sex chromosomal abnormalities in 7.3% of their study cases of which males were 2.1% and females 5.5%. Gekas J et al. [17] also reported a higher rate of aberrant karyotype in males than in females. They reported 3.32% in males and 2.77% in females for sex chromosomal abnormalities and 2.77% in males and 2.07% in females for autosomal abnormalities. Peschka B et al. [18] reported 64.4% normal karyotype in his study of infertile couples and 13.1% with abnormal karyotype. In the present study (Table 1) abnormal karyotype i.e. sex chromosomal abnormalities was found in 3 (6.5%) of the cases all of which were male. Two (8.6%) of them had 47, XXY karyotype and one (4.3%) of them had 47, XYY karyotype. The rest of the men 86.9% had normal karyotype i.e. 46, XY. Among the females, all the karyotypes showed a normal female karyotype i.e. 46, XX. The present study did not show any couple with both partners having chromosomal abnormalities.

Conflict of Interest: None

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