A CASE OF CENTRIC FUSION TRANSLOCATION IN A DEONI (BOS INDICUS) INDIAN CATTLE BULL CALF

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ABSTRACT

Introduction: Translocations are very common in cattle. This is the first report on the Robertsonian translocation in phenotypically normal Deoni cattle bull calf out of 458 cattle breeds of Indian origin Bos indicus screened so far to detect chromosomal aberrations during routine investigation. Objective: Detection of chromosomal aberrations in breeding bulls as the aberrations are associated to fertility problem in domestic animals. Method: Lymphocyte culture was set in a growth medium, RPMI-1640 supplemented with fetal calf serum, antibiotics, and mitogen. Culture was incubated at 37 degree C for 72 hrs and metaphase was arrested for chromosome study. Results: All metaphase chromosomes exhibited 59 chromosomes instead of 60. Cytogenetic investigation revealed the less chromosome numbers are because of centric fusion of two chromosomes; probably involving chromosome number 16 and 20. Conclusion: This is the first report of Deoni cattle (Bos indicus) as usually translocation or centric fusions are common chromosomal aberrations of Bos taurus cattle. Animals with centric fusion may not be used for artificial programme as the abnormality can cause repeat breeding problem in breedable female population.

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[II] MATERIALS AND METHODS

Peripheral blood was collected from phenotypically normal young bull calf of Deoni breed, in a heparinized vacutainer blood collecting tube. Chromosomal preparations were performed by using standard whole blood culture in RPMI-1640 (Gibco) medium supplemented with antibiotics, 15% fetal calf serum and 1% pokeweed mitogen [12]. The blood culture was incubated at 37°C for 72 hours. To increase the relative frequency of prometaphase chromosomes, Ethidium bromide (Sigma) @10 μg/ml was added and to arrest somatic cell division at metaphase stage, Colchicine (Sigma) @ 2 μg/ml was added to the culture for 2 and 1 h respectively, prior to the harvesting. The cells were separated by centrifugation at 150 g for 5 minutes followed by hypotonic treatment with 0.56% KCl for 20 minutes at 37°C and fixed in 3:1 ratio of methanol and acetic acid glacial. Finally, cell suspension was dropped on slides and air dried. Slides were conventionally stained in Giemsa stain for screening under the Nikon microscope.
compound microscope attached with photographic system.

[III] RESULTS AND DISCUSSION

The cattle normally possess 60 (2n) chromosomes. The karyotype composed of 29 pairs of autosomes and one pair of sex chromosomes. All the autosomes are acrocentric and sex chromosomes (XY) are submetacentric in Bos taurus, whereas Y chromosome in *Bos indicus* is acrocentric. In the present case, all the scored 50 metaphase plates of the bull exhibited a diploid number of 59 due to presence of a biarmed chromosome, in addition to the submetacentric X and acrocentric Y chromosomes [Figure–1]. This is the first time that a centric fusion translocation appeared in Deoni breed out of 458 different breeds of *Bos indicus* screened during routine investigation (karyotyping). This finding is similar to many cases reported earlier [15, 16, 17] wherein they reported 16/20 translocation. As compared to exotic cattle, no case of translocation is reported in *Bos indicus* in India. However, a few cases of translocations were reported in Indian Jersey and Holstein crossbred cattle, and buffalo population. Thiagrajan et al. [18] identified 1/29 translocation in an Indian Jersey crossbred heifer with the history of anoestrus. Similarly, Chauhan et al. [19] have also observed 1/29 translocation in a Jersey crossbred bull calf. Patel [12] reported a new centric fusion translocation [7, 16] in an Indian Holstein crossbred bull. Two cases of unusual translocation were also reported in Murrah buffaloes [20, 21] in India. Except unusual cases [19], the fertility of male is not grossly affected because of centric fusion.

The reproductive potential of Deoni bull calf with 16/20 translocation in present study is not available since it is not in semen production and it was immediately culled from the semen station because of chromosomal aberration. It is always advisable to cull and avoid using such bulls for semen production as the Robertsonian translocation can have an adverse effect on fertility, apparently due to the production of chromosomally unbalanced gametes [22, 5]. Chromosome analysis of embryos indicated the occurrence of trisomic embryos resulting from the fertilization of normal ova by hyperhaploid spermatozoa [23]. Such unbalanced zygotes which tend to die at an early stage of development in females thus giving repeat breeding problems in normal females [24, 25].
REFERENCES


