Short Communication

NUCLEOLUS ORGANIZER REGION (NOR) BANDING IN MAHABUBNAGAR LOCAL GOATS

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ABSTRACT

Nucleolus organizer regions (NORs) on the chromosomes of Mahabubnagar local goats were studied using shot-term lymphocyte culture technique. The ammoniacal silver staining procedure was followed with minor modifications. The chromosomes were stained with Silver-Giemsa staining technique using gelatin colloidal developer. The frequency distribution of number of metaphases containing the Ag-NOR bands were tested for significance by Chi-square test. A total of 213 NORs were detected in 42 metaphases. The mean number of NORs per metaphase was 5.071, with a range from 4.72 to 6.17, while the number of NORs per metaphase ranged from 1 to 13. Frequency of the metaphases reduced as the number of NORs per metaphase increased. The Chi-square test of significance has revealed that the observed frequencies departed significantly from the expected frequencies (P<0.05). The highest frequency of metaphases (21.43%) examined had one NOR, while the lowest frequency (2.38%) had 9 or 11 NORs. The chromosome morphology, number and morphometric measurements and NORs in Mahabubnagar local goats were similar to those of the descript breeds of goats in India.

Key words : nucleolus, organizer, region, banding, goats

INTRODUCTION

The Nucleolar Organizing Regions (NORs) are elements of genomes which include the heterochromatin and late replicating regions, associated with secondary constrictions, terminal and centromeric regions of defined autosomes (Halnan, 1989). The location and distribution of Ag-NORs on different chromosomes are the characteristic features of given species (Barch *et al.,*1997). No work is yet reported on NORs in Mahabubnagar local goats. Hence, this study was attempted to localize the NORs in these goats.

MATERIAL AND METHODS

The short term lymphocyte culture method, as described by Moorehead *et al.* (1960) with slight modifications, suitable to our laboratory

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conditions was followed for getting good quality metaphase spreads. The ammoniacal silver staining procedure as described by Bloom and Goodpasture (1976) and Barch *et al.* (1997) was followed with minor modifications. The unstained slides were screened under phase contrast microscope and those having good quality metaphases were subject to NOR banding. The surface of the slide warmer was covered with a silver foil. The slides were heated on a slide warmer up to 70°C. A 24 x 50mm cover slip was placed on the foil. About four drops of colloidal developer and 8 drops of silver nitrate (50%) were placed on the pre-warmed cover slip, mixed well and placed the screened slide on the cover slip to enable the chromosomes to take stain for about two minutes time or till the silver stain changed to golden yellow colour. The cover slip was then removed, excess stain rinsed with deionized water and counter stained with 2% Geimsa-stain for about 20 seconds. The slides were rinsed with water, air dried and examined under the bright field. The silver stained NORs (Ag-NORs) were visualized as black spherical bodies on yellow-brown chromosome arms. The good metaphases showing the NORs clearly were photographed. The number of NORs per metaphase were counted and subject to the analysis.The frequency distribution of number of metaphases containing the Ag-NOR bands were tested for significance by Chi-square test (Snedecor and Cochran, 1989).

RESULTS

The number of metaphases examined, number of NORs detected and mean number of NORs per metaphase for the three Mahabubnagar goats are detailed in Table 1 and the frequency distribution of NORs per metaphase are given in Table 2. The metaphase showing the location of NORs on the chromosomes is presented in Fig. 1.

In the present study, a total of 42 good metaphases were examined and a total of 213 NORs were detected. The mean number of NORs per metaphase was 5.071, which ranged from 4.72 (in 10M1, male) to 6.17 (in 8M1, male). The number of NORs per metaphase ranged from 1 to 13. In general, the frequency of metaphases reduced as the number of NORs per metaphase increased. The Chi-square test of significance has revealed that the observed frequencies departed significantly from the expected frequencies ($P<0.05$). The highest frequency of metaphases (21.43%) examined had one NOR, while the lowest frequency (2.38%) had 9 or 11 NORs.

Table 1. Number of metaphases examined, number of NORs detected and mean number of NORs per metaphase of Mahabubnagar goats

Animal . No	No. of Metaphases examined	No. of NORs detected	Mean number of NORs per metaphase
8M1	6	37	6.17
10M1	25	118	4.72
9E30	11	58	5.27
Total	42	213	5.071

Table 2. Frequency distribution of NORs per metaphase in Mahabubnagar goats

Number of NORs per metaphase	Frequency (No. of metaphases)	Percentage
1	9	21.43
2	3	7.14
3	6	14.29
4	7	16.67
6	3	7.14
7	4	9.52
8	2	4.76
9	1	2.38
10	2	4.76
11	1	2.38
12	2	4.76
13	2	4.76
Total	42	100.00

Figure 1. NOR banding in Mahabubnagar goats.

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