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Short Communication

Biophysical and morphological attributes of semen after testicular degeneration*

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ABSTRACT

Tellicherry bucks aged three years were subjected to scrotal insulation for 48 hours. The mean data of two semen collection of six bucks by artificial vagina taken in a week for three pre and 13 post-treatment were grouped and analysed statistically. The epididymal sperm are affected by scrotal insulation. There was characteristic time bound reversible changes in morphology of spermatozoa. Maximum damage was recorded on third week and complete recovery by tenth week of scrotal insulation.

Key words : Testicular degeneration, semen quality, caprine

Testicular degeneration is one of the most common cause of reduced fertility or sterility in male domestic animals. Unlike any other organ in the body, the testes react rapidly and severely to all possible external influences by degeneration (Lagerlof, 1934). Scrotal insulation techniques were adopted for experimental induction of testicular degeneration in bulls (Lagerlof, 1934) and rams (Rao and Rao, 1977). The present investigation was taken up to study the effect of scrotal insulation induced testicular degeneration on the biophysical and morphological attributes of semen in Tellicherry bucks.

Six Tellicherry bucks aged three years were subjected to scrotal insulation for 48 hours. the scrotal bag was made of double walled lint material with non-absorbable cotton and glass wool. Semen collection was made with the help of an artificial vagina. The mean data of two collection of six bucks taken in a week for a three pre and 13 post-treatment weeks were grouped and analysed statistically adopting standard procedure. The biophysical and morphological attributes such as semen volume, mass activity, motility, live sperm count and spermatozoal abnormalities were studied (Hancock, 1965 and Evans and Maxwell, 1987).

The mean volume of semen collected during the pre-treatment period was 0.83±0.01 ml. Decline in semen volume was highly significant and reached the lowest level to 0.37±0.07 ml by 6th week. Lower ejaculate volume was also reported by Rao and Rao (1977) in rams, Kishore and Rao (1983) and bucks and Asokan (1991) in rams. The reduction in semen volume observed in this study could be more due to reduction in spermatozoal concentration than in seminal plasma from accessory glands.

The average mass activity and initial motility of pre-treatment control bucks in this study was 4.46±0.08 and 91.85±0.41 percent, respectively. The mass activity was zero during second and third week post-treatment. Only by tenth week it reached 4.08±0.14. during second and third week the initial motility was 1.16±1.22 percent and zero respectively. Only by eleventh week it reached 92.08±0.74 percent which was not significantly different from pre-treatment control. Scrotal insulation was reported to bring about significant decline in the mass activity and initial motility in rams (Smith, 1971; Rao and Rao, 1977) in bulls (Rao, 1967) and in boars (Wettemann *et al.*, 1976).

The mean percentage of live sperms in pre-treatment control bucks was 92.83±4.54, it reached the lowest level of 11.36±3.29 on fourth week thereafter there was a gradual recovery. Asokan (1991) recorded reduced live sperm by 0-8 days and to zero percent during 9-24 days post heat stress in rams. In the present study the decline in spermatozoal motility could be due to decrease in spermatozoal

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concentration and decline in the percentage of live sperms upto ninth week. The reduced sperm motility and live sperm due to thermal stress was coincident with the increase in abnormal spermatozoa.

The mean percentage of detached sperm head was 0.93±0.29 during pre-treatment period. Its incidence increased to 4.13±2.34 and 40.47±11.25 percent during first and second week post-treatment period. Increase in detached head six to eight days after insulation was reported in bulls by Barth and Bowman (1994). The fact that detached head appeared during first week post-scrotal insulation denotes that the separation of head and tail took place in epididymis as suggested by Hancock (1995).

During pre-treatment control the incidence of proximal and distal droplet were 0.97±0.02 and 0.92±0.51 percent, respectively. The distal and proximal droplet reached its peak of 4.09±1.54 and 11.47±5.32 percent on first and third week post-treatment respectively. Thereafter, their incidence significantly high upto to seventh to eight week post-treatment. Scrotal insulation was shown to increase the incidence of sperms with proximal droplet in bulls (Rao, 1967). The high incidence of retained protoplasmic droplet has been related to disturbances in sperm maturation or in epididymal dysfunction (Ott *et al.*, 1982; Thilander *et al.*, 1985).

The incidence of tail abnormality rose significantly from 0.94±0.49 of pre-treatment level to 2.27±0.76 by first week and than to 4.34±0.56 during second week. Thereafter it remained significantly high upto seventh week post-treatment. Kishore and Rao (1983) observed maximum percent of tail abnormalities in bucks subjected to scrotal insulation for 48 and 96 hours. Cupps and Briggs (1965) noticed degeneration of the epididymal epithelium significantly produced looped tails from the caudal epididymis.

The mean total abnormal spermatozoa in the pre-treatment control bucks was 3.76±0.33. Highly significantly increase from first week was observed and it reached its peak on third week to 55.53±4.28 percent. Then it gradually reduced to 2.02±0.39 percent by tenth week.

The resutls of the present study confirm the earlier report that scrotal insulation produces characteristics time bound reversible changes in morphology of spermatozoa. It is further confirmed that epididymal sperm are affected by scrotal insulation. The latter part of spermiogenesis is affected since there is maximum damage at a particular time (third week) and complete recovery sets in by tenth week after testicular degeneration (Fig. 1 & 2).

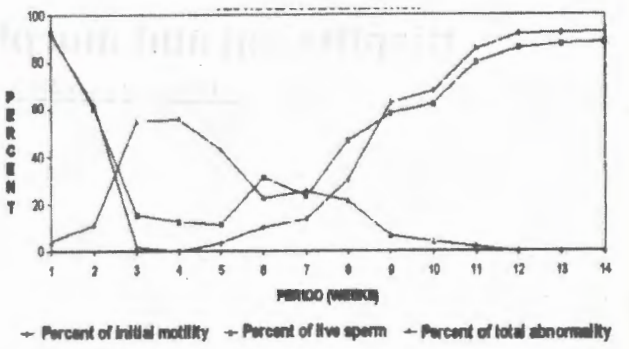

Fig.1 Changes in biophysical and morphological character of spermatozoa after testicular degeneration

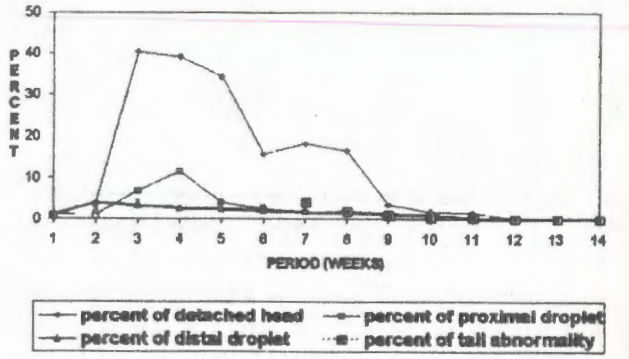

Fig.2 Percentage of incidence of morphologically defective sperms after testicular degeneration

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