

MORPHOLOGICAL CHANGES IN EPIDIDYMAL SPERMATOZOA OF RED SOKOTO (MARADI) BUCKS

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ABSTRACT

Morphological changes in the caput, corpus and cauda epididymides were studied in this experiment. The objective was to study morphological changes in goat spermatozoa using the Red Sokoto goat. Progressive motile spermatozoa were first observed in the caput epididymis (5-7%) and was highest at the cauda epididymis (60%). Progressive motility for the corpus epididymis ranged between 20-30%. Cytoplasmic droplets were lost as the spermatozoa moved up the epididymis. Proximal cytoplasmic droplet was significantly ($P < 0.05$) lowest at the cauda epididymis. Other morphological changes did not follow a particular trend.

Keywords: Epididymal spermatozoa, maradi bucks.

INTRODUCTION

Most of the work relating to morphological changes of spermatozoa during epididymal transit have been on cattle (Igboeli and Foote, 1968; Amann and Almquist, 1962; Cupps and Briggs, 1965; Akusu *et al.*, 1985). They have varying reports on the site of commencement of motility, stainability, morphology and position of the protoplasmic droplets.

Young (1931) had earlier reported species differences in the rate of developmental changes during epididymal transit. This study is a contribution to the little information

available on morphological changes in goat spermatozoa during epididymal transit.

MATERIALS AND METHODS

Sampling

Testes used for this experiment were sampled from Bodija abattoir during the late rainy season (July to August). Bodija abattoir is located about three kilometers (3km) from the University of Ibadan campus. The animals arrive at Ibadan by road from Northern Nigerian, mostly from Sokoto and also from Niger Republic.

A total of eighteen (18) adult (1.5-2yrs old) animals, with an average live-weight of 18.5kg were randomly sampled. The testicles were removed immediately between 0700 hours and 0800 hours. Removal of testicles was through an extended incision on the scrotum. The right and left testicles were collected separately and transferred into labeled nylons. The samples were immediately placed in well insulated ice box maintained at 4 to 10°C. Samples were taken to the laboratory within 30 minutes of collection.

Preparation of Spermatozoa

Spermatozoa were obtained in all testicles examined from the caput, corpus and cauda epididymides. The method of collection from these locations was generally similar to that of Akusu *et al.* (1985).

The spermatozoa recovered was used to study motility, live/dead (using eosin-negrosin

stains) and morphology (using Wells and Awa stains). Two slides were prepared per location for each sample. The mean of their estimations was used.

Microscopy

Mass activity motility and live/dead were determined at a magnification of X400 and morphological studies were done under oil immersion at a magnification of X1000.

Statistical Analysis

The mean and standard deviations were computed for spermatozoa characteristics determined. The data were treated as a complete randomized design, each location representing a treatment. Analysis of variance was done and where means were significantly different, separation of mean was done using Duncan's multiple range test (Steel and Torrie, 1980).

RESULTS AND DISCUSSION

Mass activity was rated on a scale of 0 to 5 as described by Zemjanis (1977). The mass activity for the caput, corpus and cauda epididymides were estimated as 1, 2 and 4 respectively.

Progressive motility increased from the caput to the cauda epididymis. The mean values of progressive motility were estimated to be between 5-7% for the caput, 20-30% for the corpus and 60% for the cauda epididymis. Percentage live spermatozoa was generally high ranging between 75-80% in the caput and 90% and above in the corpus and cauda epididymides.

The increased progressive motility from the caput to the cauda epididymides agrees with earlier findings in the bull (Amann and Almquist, 1962; Igboeli and Foote, 1968; Akusu *et al.*, 1985) and goat (Chaudhury and Majumdar, 1983). It also corroborates the fact that the pattern of motility of spermatozoa increases along the epididymis. Thus the fertilizing ability of spermatozoa will increase during their passage throughout the epididymis. However, a progressive motility

of 5-7% observed in the caput epididymis is higher than zero reported by Chaudhury and Majumdar (1983) in black Bengal goat. This finding points to the possibility of breed differences in the pattern of commencement of progressive sperm motility.

Cytoplasmic Droplets

The mean values of proximal and distal cytoplasmic droplets in the caput, corpus and cauda epididymides are shown in Table 1. Proximal droplets decreased from the caput to the cauda epididymides as reported for cattle (Arthur, 1977; Akusu *et al.*, 1985) and goat (Chaudhury and Majumdar, 1983). The low level of proximal droplet at the cauda epididymis suggested a normal physiological status of the epididymis of these animals. The incidence of distal droplets was significantly ($P < 0.05$) more than proximal droplets in the cauda epididymis. However, this is not of any serious implication as distal droplets are lost during ejaculation. (Zemjanis, 1977)

Other Morphological Changes

Head, midpiece and tail abnormalities are shown in Table 1. The incidence of primary abnormalities, detached acrosome and bent tail was less than the upper limit of 20%, 5% and 25% respectively recommended for bulls (Zemjanis, 1977).

Morphological changes in this study did not follow any particular trend. Besides, the wide deviations from the mean values (Table 1) shows that they are more individualistic. However the incidence of abnormal forms was lowest in the Cauda epididymis. This agrees with the earlier findings in cattle (Amann and Almquist, 1962; Igboeli and Foote, 1968; Akusu *et al.*, 1985). Apart from detached head (which is a tertiary abnormality) bent mid-piece was significantly ($P < 0.05$) higher than any abnormal form observed. The low incidence of secondary abnormalities as observed implies a high functional integrity of the epididymis (Zemjanis, 1977). From all indications most of the detached head and separated acrosome observed in this study are

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tertiary abnormalities (Moss *et al.*, 1979). The incidence of morphological abnormalities

observed in these animals can not impair their reproductive performance.

TABLE 1: MEAN PERCENTAGE (% , ± SD) OF DIFFERENT MORPHOLOGICAL CONDITIONS OF EPIDIDYMAL SPERMATOZOA AND THEIR LOCATIONS

Abnormality	Location		
	Caput	Corpus	Cauda
HEAD			
Narrow	1.63 ± 1.58 ^a	0.56 ± 0.91 ^b	0.61 ± 0.18 ^b
Small	1.63 ± 1.58 ^a	0.56 ± 0.91 ^b	0.61 ± 0.18 ^b
Big	0.29 ± 0.58 ^b	0.75 ± 1.25 ^a	0.00 ^c
Detached	3.68 ± 5.39 ^a	4.35 ± 4.75 ^a	1.15 ± 1.7 ^b
Separated Acrosome	0.34 ± 0.58	0.20 ± 0.57	0.31 ± 0.79
MID-PIECE			
Bent	4.7 ± 3.70 ^b	8.89 ± 4.83 ^a	5.88 ± 3.02 ^b
Coiled	0.34 ± 0.54	0.53 ± 1.86	0.22 ± 0.38
Tail			
Bent	2.07 ± 2.46	3.24 ± 1.98	2.32 ± 1.34
Coiled	1.80 ± 3.18	1.19 ± 1.24	1.58 ± 1.52
DROPLETS			
Proximal	76.06 ± 17.74 ^a	49.69 ± 15.22 ^b	17.82 ± 6.65 ^c
Distal	15.49 ± 17.37 ^c	35.58 ± 14.97 ^b	54.74 ± 23.93 ^a
Spermatids and spermatocyte	0.49 ± 0.96 ^a	0.00 ^b	0.00 ^b
Progressive motility	5-7	20-30	60

Means in the same row with differing superscripts are significantly different (P<0.05)

CONCLUSION

Maturation changes during epididymal transit was generally similar to those reported in other species. The incidence of abnormal sperm forms is individualistic, hence the high standard deviation from the mean values for most of the morphological abnormalities observed.

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