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Short Communication

Phosphate and transaminase content of epididymal and ejaculated semen of buffalo bulls

H.P. GUPTA[1†], K.L. SAHNI[2] AND G. MOHAN[3]

Division of Animal Reproduction
Indian Veterinary Research Institute, Izatnagar - 243 122 (UP)

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ABSTRACT

Alkaline phosphatase, glutamic oxalo-acetic transaminase and glutamic pyruvic transaminase were studied in the epididymal and ejaculated semen samples to study their role in the epididymal maturation of buffalo spermatozoa. Alkaline phosphatgase (IU/L) averaged 1151.31±213.42, 5531.73±953.85 and 886.66±42.26 in the caput (N = 60) and ejaculated (N = 36) semen, respectively. Corresponding values (IU/L) for lutamic oxalo-acetic transaminase were 149.88±13.65, 649.27±77.69 and 64.97±7.45. Glutamic pyruvic transaminase averaged (IU/L) 10.88±0.96, 102.10±15.91 and 126.78±5.33. These enzmes were associated with epididymal maturation of buffalo spermatozoa. They also helped in maintaining epididymal quiescence and ensuring better tolerance and quality of semen in terms of motility and morphology of spermatozoa.

Key words : Enzyme, epididymal semen, buffalo

Biochemical milieu of ejaculated buffalo semen has been well studied (Kapoor, 1978; Kumar *et al.*, 1984; Mohan *et al.*, 1992). However, the same has not been well documented for epididymal semen of buffalo bulls (Jindal, 1998; Kulkarni *et al.*, 1998). The biochemical milieu of epididymal semen exercises control over *in vivo* maturation of spermatozoa before being stored in th terminal segment of the epididymis (Hafez and Hafez, 2000). Therefore, present study was undertaken to estimate phosphatase and transaminases in the content of different segment of buffalo epididymis and to correlate them with the development of sperm motility.

One hundred and twenty epididymis were obtained from freshly slaughtered 60 buffalo bulls. The epididymal semen was collected by micro-puncture technique from caput, corpus and cauda epididymis (Jindal, 1988). Semen samples obtained from concerned segments of both the epididymis of each bull were pooled (N = 60). An aliquots of all the samples were evaluated for sperm motility after dilution in egg yolk tris dilator and incubation for 10 minutes at 37°C. Semen from cauda epididymis was grouped into subtype I (poor quality showing sperm motility less than 50%) and subtype II (good quality showing sperm motility 50% and above). Samples from caput and corpus epididymis were also grouped as type I and II, as above. Pure semen could not be collected from corpus epididymis, hence, no biochemical analysis was done. Ejaculated semen samples (N = 36) were also studied for comparison from 3 Murrah buffalo bulls of Germ Plasm Centre, Division of Animal Reproduction. Neat caput epididymal and ejaculated semen samples were centrifuged to separate seminal plasma. However, cauda epididmal semen was diluted @ 1:4 in tris citric acid buffer before centrifugation because of its high viscosity. Alkaline phosphatase, glutamic oxalo-acetic transaminase and glutamic pyruvic transaminase were estimated in all the above samples (Oser, 1979). Data were statistically analysed using simple CRD with unequal observations (Steel and Torrie, 1981).

Alkaline phosphatase : The alkaline phosphatase (AKP) varied significantly ($P < 0.01$) among various types and subtypes of semen studied. However, the differences between subtyps at caput and cauda epididymal level were not significant. Thus, it might not be responsible for quality of epididymal semen. However, the AKP was significantly ($P < 0.01$) higher in the cauda epididymal semen than in the ejaculated and caput epididymal semen. It is in agreement with finding of Jones (1978), who observed very high AKP activity in the mammalian cauda epididymal plasma. The higher AKP activity in the cauda epididymal semen might

[1]Associate Professor, COVsc, GBPUA&T, Pantnagar
[2]Retd. Head, A.R.
[3]Retd. Principal Scientist

[†]Corresponding author

help remove dead or effete spermatozoa from epididymis to ensure ejaculation of normal fertile spermatozoa (Mann and Lutwak Mann, 1981). This might also help inhibit cauda epididymal spermatozoa to maintain a quiescent stage through higher phosphates which are inhibitory to sperm (Bishop and Salisbury, 1955). Increase in the AKP activity was associated with development of and increase in the sperm motility reflecting its role in the epididymal maturation of spermatozoa (Cooper, 1986).

Transaminases : The glutamic oxalo-acetic transaminase (GOT) and glutamic pyruvic transaminase (GPT) differed significantly ($P < 0.01$) among various types of semen studied. The differences between subtypes at caput and cauda epididymal level were also significant except GPT at caput level. The lower level of GOT and GPT in good quality cauda epididymal semen samples (subtype II) are well in agreement with the report of negative correlation of transaminases with semen quality (Ibrahim, 1982). Similar to AKP, significant increase in GOT and GPT from caput epididymis to cauda epididymis was associated with development and increase in sperm motility. The transaminases are involved in the oxidative metabolism of spermatozoa (Salisbury *et al*., 1978). They seem to be important for epididymal maturation of spermatozoa during which spermatozoa acquire capacity for progressive motility and ability to fertilize the ovium (Cooper, 1986). Thus increasing trend is well conceived.

The GOT activity decreased significantly ($P < 0.01$) from cauda epididymal semen to ejaculated semen. However, the differences were not significant in respect of GPT. The decline in the GOT from cauda to ejaculated semen might be possibly due to dilution of cauda epididymal semen at ejaculation (Mann and Lutwak-Mann, 1981). The higher level in the cauda epididymis might have rendered spermatozoa high tolerance and helped to maintain quiescent state for longer storage in this part of the epididymis (Chaudhary and Sadhu, 1976; Hafez and Hafez, 2000).

Thus, it may be concluded that the AKP, GOT and GPT play a crucial role in the epididymal maturation of bubaline spermatozoa for development of sperm motility. They also help in maintaining epididymal quiescence and ensuring better quality of semen in terms of motility and morphology of spermatozoa.

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