



Comparative distribution of glomerular peripolar cells in animals

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Juxta glomerular apparatus conventionally consisted of macula densa, mesangial cells and juxta glomerular cells but Ryan *et al.* (1979) reported the glomerular peripolar cells at the vascular pole of the renal glomerulus at the junction of parietal and visceral epithelium. The most important feature of these cells is the presence of large number of closely packed cytoplasmic granules. Although literature regarding these cells is not very extensive, yet few reports are available in sheep (Ryan *et al.* 1979), and no reports are available in buffalo, horse, dog and goat. Hence the present study was aimed to study the distribution of peripolar cells in these species.

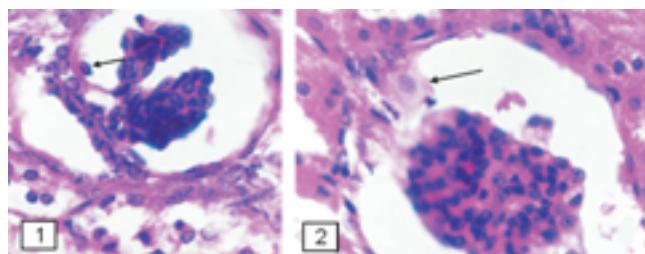
The present study was conducted on the kidneys of buffalo (adult and neonate), horses, dogs and goats (6 for each species). The samples were collected from the veterinary clinics (post-mortem hall) and slaughterhouse. The tissues of kidneys were fixed in the neutral buffered formalin and Bouin's solution and processed for paraffin blocks preparation by acetone benzene schedule (Luna 1968). The 50 serial sections of 3–5 μ m were cut from each block and stained with hematoxylin and eosin, Masson's trichrome and periodic-acid–Schiff stains. In the stained sections, the cortex of the kidneys was examined from surface to the corticomedullary junction and in doing so 150 glomeruli were examined in kidney of each animal. The peripolar cells were also quantified by calculating the peripolar cell index by expressing the number of glomeruli in which atleast one peripolar cell could be identified as a percentage of total number of glomeruli observed.

In the present study, peripolar cells were localized in each kidney towards the vascular pole at the junction of parietal and visceral epithelium but not in all the glomeruli. The cells could only be seen in those glomeruli, which were having vascular pole with afferent and efferent arterioles. The cells were more commonly found in the outer part of the cortex. It might be due to the reason that nephrons in the different parts of kidneys have different functional properties. Hence,

these cells might play an important role performed by the glomeruli present in the outer cortex. Friedberg (1964) and Gall *et al.* (1986) reported that juxtaglomerular rennin granulations was more prominent in the outer cortical glomeruli as compared to the deep cortical glomeruli in mice. The shape of these cells varied from elongated like parietal epithelial cell to larger cells. The nucleus of these cells was vesicular. In goat, the cells were large and plump (Fig. 2), in dogs the cells were fusiform or ovoid in shape whereas horses and buffaloes had an intermediate shape (Fig. 1) between goats and dogs. The smaller cells tended to be elongated, thin and contained few granules whereas larger cells were plump. The cytoplasm of the cells contained granules which were PAS +ve. These cytoplasmic granules were also stained with the Masson's trichrome stain and occasionally the granules showed the heterogeneity i.e. some granules stained blue while others stained red. It has been suggested that these granules undergo exocytosis into the glomerular filtrate and thus might play a role in the glomerulotubular balance and electrolyte homeostasis (Ryan *et al.* 1979). Some studies on sheep peripolar cells using an antibody against the rat urinary kallikrein indicated that their granules might contain kallikrein or an immunoreactive kallikrein like polypeptide. This kallikrein triggers the release of active renin and inactivate the atrial natriuretic factor (Gall *et al.* 1986). Later on Downie *et al.* (1992) reported that these cells contained plasma proteins suggesting the peripolar cells to be absorptive cell but the morphology of the cell is more or less like a secretory cell. An inverse relationship between the number of peripolar cells and renin secreting cells was also suggested (Gardiner *et al.* 1986). However still the function of these cells is controversial.

The peripolar cell index for horse was 2.53 ± 0.15 , for dog 3.20 ± 0.24 , for goat 18.53 ± 0.73 , for neonates buffalo 5.60 ± 0.24 , and for adult buffalo it was 3.53 ± 0.24 . The index was more in goats indicating highest number of the glomeruli having the peripolar cells among the species studied and the shape of cells was globular. Comparing the values of neonate and adult buffaloes, the index was more in the neonates. It may be due to the reason that in new born animals when the

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Figs 1–2. Paraffin sections showing peripolar cells (arrow) in the vicinity of glomerular capsule: 1. In the kidney of adult buffalo. Hematoxylin and Eosin $\times 1000$; 2. In the kidney of goat. Hematoxylin and Eosin $\times 1000$.

kidney first assume the major responsibility for water and electrolyte homeostasis, the peripolar cells may play a significant role in regulating the renal functions. Earlier a high peripolar cell index was reported in sheep, kangaroos, Koalas and newborn rats whereas lower values were reported in monkey, rabbits, giraffe and adult rats (Gall *et al.* 1986).

SUMMARY

The present study was conducted on 6 kidneys each of horse, dog, goat and buffalo (neonates and adult) to localize the peripolar cells at vascular pole of the glomerular capsule. Approximately 150 glomeruli were examined in 50 serial sections of each animal. The peripolar cells were more commonly observed in the glomeruli present in outer part of the cortex. The shape of these cells varied; in goat the cells were large and plump, in dogs the cells were fusiform or ovoid whereas horses and adult buffaloes had an intermediate

shape between goats and dogs. The cytoplasm of these cells contained granules which were PAS +ve and could also be stained with Masson's trichrome stain. The peripolar cell index for horse was 2.53 ± 0.15 , for dog 3.20 ± 0.24 , for goat 18.53 ± 0.73 , for neonates buffalo 5.60 ± 0.24 , and for adult buffalo it was 3.53 ± 0.24 .

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