

Histomorphology of epidermis in adult Jabalpur Black pigs

SHAZIA MAJEED¹, M L PARMAR², MASSARAT KHAN³ and F D SHEIKH-DEVAJUENG⁴

Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur, Madhya Pradesh 482001 India

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The structure of skin and its associated structures were explained in domestic animals (Dellmann and Brown 1987). However documentation on the skin of pig and its component layers appeared meager. Hence, the present investigation was planned to elucidate the histological details epidermis on Jabalpur black pigs.

Skin samples of 6 adult (Large White Yorkshire×Desi crossbred) Jabalpur black pigs aged between 6–12 months (adult) were utilized for the present investigation. Skin samples approximately 3–5 mm from various regions of the body were collected and immediately fixed in 10% neutral buffered formalin. The different regions from where these samples were collected are: Upper eyelid, lips, pinna, neck region (lateral), back (dorsal), xiphoid region (ventral), arm (lateral and medial), scrotum, carpal region (dorsal and palmar), tarsal (dorsal and plantar), tail (dorsal and ventral) and prepuce. Haematoxylin and eosin van-giesons stain, gomoris silver impregnation method, weigerts elastic stain, PAS, toluidine blue and mowrys colloidal iron and gomoris calcium phosphate for alkaline phosphatase activity (Drury and wallington, 1980). In addition to histomorphological studies, the thickness of epidermis was measured by using calibrated micrometer eyepiece.

The epidermis of adult (Large White Yorkshire×desi crossbred) Jabalpur black pigs comprised 4 strata stratum basale, stratum spinosum, stratum granulosum and stratum (Fig. 1) corneum. However, the presence of epidermal peg was the most characteristic feature of pig skin (Fig. 2) and epidermal pegs of variable size were observed. The largest epidermal pegs were observed in neck and back where as smallest were seen in the dorsal aspect of thigh and plantar aspect of tarsus. The epidermis was thickest in the dorsal aspect of tail followed by neck and lateral aspect of arm ie $269.60 \pm 23.04 \mu\text{m}$ and $224.80 \pm 14.97 \mu\text{m}$ and

Present address: ¹SRF, NAIP-Pashmina Project, ³Professor, Department of Veterinary Anatomy and Histology, ⁴Assistant Professor, Animal Breeding and Genetics (aizar22@gmail.com), SKUAST-K, Srinagar. ²Professor Department of Veterinary Anatomy and Histology, Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur, Madhya Pradesh.

Table 1. Thickness (μm) of epidermis

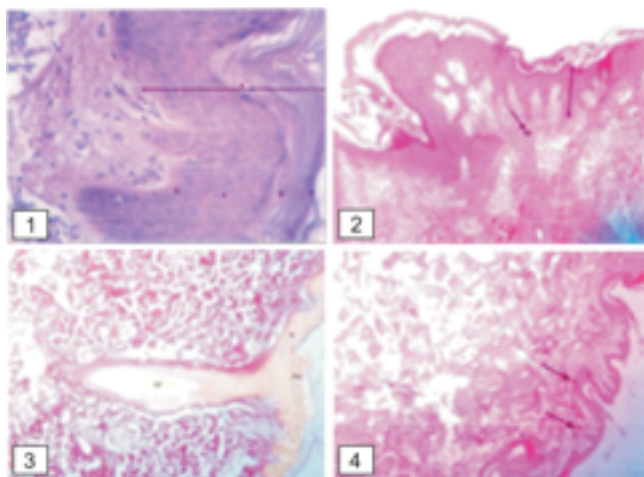
Region	Epidermis (μm) mean $\pm$ SE(μm)	Region	Epidermis mean $\pm$ SE(μm)
Lips	160.00 ± 36.42	Thigh (lateral)	117.20 ± 16.95
Upper eyelid	$140.20 \pm 44.3 \pm 6$	Thigh (medial)	127.60 ± 170.98
Pinna	190.80 ± 23.32	Tarsal (dorsal)	140.00 ± 26.98
Neck	224.80 ± 14.97	Tarsal (plantar)	130.00 ± 42.23
Back	160.20 ± 43.24	Tail (dorsal)	269.00 ± 23.04
Arm (lateral)	216.00 ± 38.38	Tail (Ventral)	18.20 ± 4.29
Arm (medial)	124.40 ± 17.26	Scrotum	145.60 ± 35.63
Carpal (dorsal)	20.00 ± 4.04	Prepuce	164.00 ± 16.26
Carpal (palmar)	94.80 ± 28.33	Xiphoid	198.80 ± 38.69

$216.06 \pm 38.37 \mu\text{m}$ respectively and thinnest in the ventral aspect of tail $18.20 \pm 4.29 \mu\text{m}$, dorsal aspect of carpal $20.00 \pm 4.04 \mu\text{m}$ and palmar aspect of carpal $97.80 \pm 28.33 \mu\text{m}$ (Table 1).

Regional variation and thickness of skin is reported in domestic animals (Sission and Grossman 1964). The thickest skin observed in the region of dorsal aspect of tail tallies with the similar report made by Tripathi (1997) in goat.

Stratum basale in all regions consisted of simple cuboidal to columnar epithelium which rested on the basement membrane. The nucleus was large and ovoid in shape which occupied larger areas of cell. Some cells of basal layer showed mitotic division and pigmentation. Melanin pigments were distributed in this layer and it confirms the report made by Ham (1979). Stratum spinosum comprised few to several layers (8–12) of irregular polyhedral cells. In the upper eyelid, the epidermis was comparatively thin, highly pigmented and folded (Fig. 3). It comprised 6–8 layers of polyhedral cells at the greatest epidermal peg and 2–3 cells layers between the epidermal peg. The large number of cell layers at the level of epidermal peg was found to be in xiphoid (20–22), plantar aspect of tarsal (18–20), lips (12–20) and pinna (10–20) and between epidermal pegs in neck (10–20), lips (7–8) and pinna (5–8).

The stratum granulosum comprised 2–3 layers of flattened cells, which were parallel to the epidermal-dermal junctions



Figs 1–4. **1.** Photomicrograph cross section of back skin showing layers of epidermis (e), stratum basale (b), stratum spinosum (s), stratum granulosum (g) and stratum corneum (c). H&E×200. **2.** Photomicrograph cross section of lateral aspect of arm skin showing epidermis (e) and epidermal pegs (ep). H&E×100. **3.** Photomicrograph cross upper eyelid showing pigmented epidermis (Pe) and hair follicle (hf) emerging out of epidermis (e) Van Geison's stain ×40. **4.** Photomicrograph cross section of medial aspect of thigh skin showing intense alkaline phosphatase (AKP) activity in stratum basale. Alkaline phosphatase×40.

in all regions of the body during present investigation. This layer was distinguished by the presence of keratohyaline granules. Stratum corneum consisted of several layers of completely keratinized dead cells. The cell layers of stratum corneum varied greatly in different areas of the body. In the present study it was thinnest in lips consisting of 1–2 layers of cells and thick in pinna consisting of 3–4 layers of cells. The stratum corneum formed thicker layer having 6–7 cell layers the neck and back regions.

The stratum lucidum was not observed in any of the regions of pig skin under present studies because the entire region was hairy. The present observations support the reports

of Sar and Calhoun (1966), who reported that stratum lucidum was present only in the non-hairy regions of the skin. A strong alkaline phosphatase activity was seen in the stratum basale (Fig. 4) which indicates presence of calcium deposits in this layer

SUMMARY

Histomorphological studies of epidermis in 6 adult (Large White Yorkshire×desi crossbred) Jabalpur black pigs was conducted and it was found that epidermis consisted of stratum basale, stratum spinosum, stratum granulosum and stratum corneum. However, epidermal pegs of variable size were observed which was the most characteristic feature in pig skin. The epidermis was the thickest in the dorsal aspect of tail $269.00 \pm 23.04 \mu$ and thinnest in the ventral aspect $269.00 \pm 4.29 \mu$. A strong alkaline phosphatase activity was seen in the stratum basale and stratum corneum which indicates the presence of calcium deposits in these 2 layers.

REFERENCES

- Chandra's. 2001. *Piggery India Year Book 2002*, 2nd edn. P38.
- Drury R A B and Wallington E A. 1980. *Carletons Histological Technique*. 5thedn, P 519. Oxford University Press, Oxford, New York, Toronto.
- Dellmann H D and Brown E M. 1987. *Textbook of Veterinary Histology*. 3rd edn, pp382–415. Lea Febiger, Philadelphia.
- Ham A W. 1979. *Histology*. 8th edn, pp 613–644. J.B Lippincott. Company and Philadelphia and Toronto.
- Ratner D. 1998. Skin grafting. *Dermatology Clinical* **16** (1): 75–90.
- Sar M and Calhoun M L. 1966. The microscopic anatomy of integument of common American goats. *American Journal of Veterinary Research* **27**: 444–56.
- Sisson S and Grossman J D. 1964. *The Anatomy of the Domestic Animals*. 4th edn, pp 906–27. W.B. Saunders, Philadelphia.
- Tripathi M, Malik M R and Shrivastav A M. 1997. Histogenesis of sweat gland in goat. *Indian Journal of Animal Sciences* **67** (9): 748–51.