Original Research

Histochemical Studies on Penis of the Boar (*Sus scrofa domesticus*)

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Abstract

Periodic acid Schiff (PAS) reaction was observed to be weak in the corpus spongiosum penis and urethra. In the Periodic acid Schiff-Alcian Blue (PAS-AB) reaction the cavernous spaces and corpus spongiosum of boar penis were blue in color which indicates that it comprises of acid mucopolysaccharides. The tunica albuginea and corpus spongiosum penis were black colored in Acid phosphatase (ACP) activity. Alkaline phosphatase (ALP) activity was moderate in the penis of the boar. Oil red 'O' activity was intense and red colored droplets were observed in the corpus cavernosum penis which indicates the presence of lipids. The corpus spongiosum penis stained black color in the green background with Succinic Dehydrogenase (SDH) activity.

Key words: Acid Phosphatase (ACP), Alkaline Phosphatase (ALP), Histochemical Studies, Oil Red 'O', Periodic Acid Schiff (PAS), Succinic Dehydrogenase (SDH)

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Introduction

Boars were sustained copulators. Their intromission time was 5-20 minutes. Boar was able to ejaculate 150-500 ml of semen in each ejaculation. If we provide sexual stimulus, it can be able to ejaculate 8 times in a day. The penis was a very active organ in the body of the boar. To know the location of enzymes in the penis of the boar, histochemical studies were conducted. Histochemical studies were used for demonstration of chemical elements like carbohydrates, proteins and fats in tissues. For the demonstration of Carbohydrates, PAS, PAS– AB methods were used. For enzymes, Gomori's ACP, ALP methods were used and for fats, Oil red 'O' in Propylene glycol method were used. Histochemical studies on penis of boar with different elements was undertaken to recognize its localization at microscopical level, their functional standings and thereby the significance of same.

Material and Methods

Paraffin sections of penis were subjected to the following histochemical techniques-

1. Periodic Acid Schiff reaction (Singh and Sulochana, 1998).
2. PAS – Alcian blue method for acid and neutral mucopolysaccharides (Singh and Sulochana, 1998).

Cryostat sections of 8-10 µm thickness were obtained from fresh tissue samples of Penis prefixed in chilled neutral buffered formalin and were used for the following histochemical techniques-

1. Gomori's acid phosphatase method (Singh and Sulochana, 1998) for localization of acid phosphatase enzyme.
2. Gomori's alkaline phosphatase cobalt method (Singh and Sulochana, 1998) for localization of alkaline phosphatase enzyme.
3. Oil red 'O' in propylene glycol method for demonstration of fats (Singh and Sulochana, 1998).

Frozen sections obtained from unfixed fresh tissues were used for the succinic dehydrogenase activity (Singh and Sulochana, 1998).

Results and Discussion

In the present study, reaction to PAS was weak (Fig. 1) and reaction to PAS-AB was intense (Fig. 2) in tunica albuginea of corpus cavernosum, corpus spongiosum and lining epithelium of urethra and urethral glands at root of the penis.

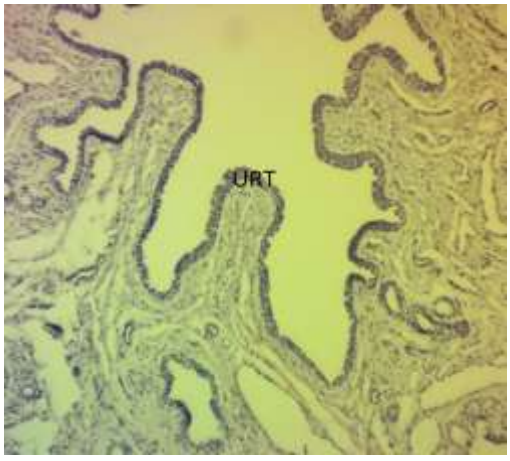

Fig.1: Photomicrograph showing periodic acid Schiff activity in root of boar penis. PAS 4x. Urethra (URT).

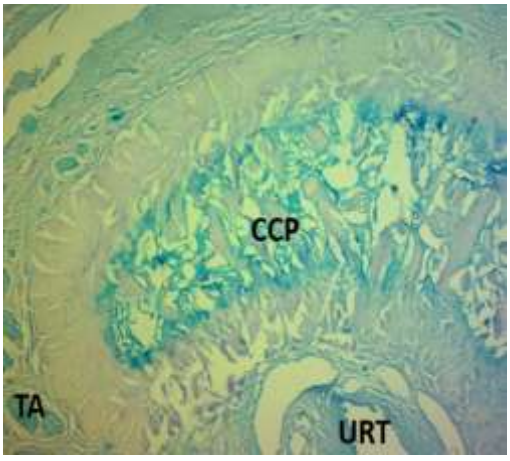

Fig.2: Photomicrograph showing PASAB activity in body of boar penis. PAS-AB 4x. Tunica aibuginea (TA), Corpus cavernosum penis (CCP), Urethra (URT).

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PAS-AB positive areas were stained with blue color. Present observations reveal that the penis of boars comprise a sizeable quantity of acid mucopolysaccharides than the neutral one, which is partially resembling the diffuse reaction of urethral glands of camel to PAS as reported by Ali *et al*. (1976). Tunica albuginea, the elastic fibrous connective tissue provides strength and support to penis during erection. Glycogen which entails the source of energy by PAS has shown weak activity, was indicating the less functioning of tunica albuginea. The PAS-AB pointed towards the presence of mucins which coats mucosal surfaces by viscous and elastic material. Its intense reaction at the corpus cavernosum and spinosum, lining epithelium of urethra and urethral glands at the root of penis might be emphasising the promotion and protection of the same against inflammation and cancer.

ACP activity was intense stain the positive areas black color (Fig. 3) and ALP activity was moderate (Fig. 4) in tunica albuginea of corpus cavernosum, spongiosum and urethral mucosa of the penis. ALP activity was weak at tip of the penis.

Fig. 3: Photomicrograph showing Acid Phosphatase activity in body of boar penis. ACP 4x. Tunica aibuginea (TA), Corpus spongiosum penis (CSP), Urethra (URT).

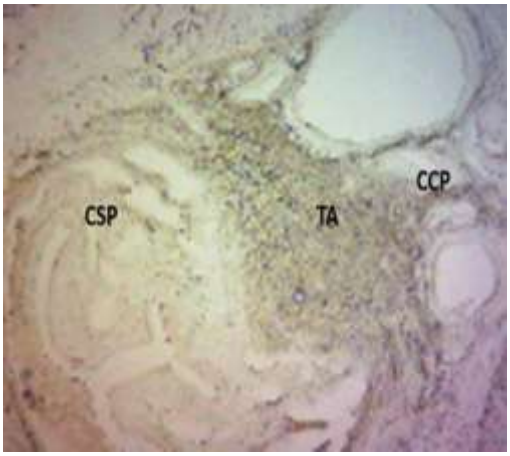

Fig.4: Photomicrograph showing Alkaline Phophatase activity in body of boar penis. ALP 4x. Tunica aibuginea (TA), Corpus cavernosum penis (CCP), Corpus spongiosum penis (CSP).

These observations are akin to the reports of Rollinson (1974) who stated that ACP reaction was predominant in nuclei of lining epithelium of penile urethra, whereas ALP reaction was restricted to basement membrane and capillaries of reproductive tract in zebu bull. Intense activity of ACP at tunica albuginea of corpus cavernosum, spongiosum and urethral mucosa of penis confirms the minimal functional vigour of these microscopical components of penis while the ALP activity was moderate there supporting the functional ability in same line. The weak ALP activity what has been observed at tip of penis, indicating the vigorous copulatory component with full of life.

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Oil red 'O' activity was intense (Fig. 5) in the corpus cavernosum penis at root, body and tip of the penis respectively. Oil Red O positive areas were observed as red droplets in the cavernous spaces indicates the presence of lipids in good quantity in boar penis, which is in partial agreement with expression of lipids in the cytoplasm of secretory cells of the urethral glands in camel as reported by Ali *et al*. (1976). The intense activity of oil red 'O' stain in the corpus cavernosum of penis root, body and its tip illustrates the stored lipids. The optimum stored lipids can be used as a reservoir of source of energy for steroid synthesis and membrane formation but the excessive lipid droplet accumulation might be representing the metabolic deficiency leading to cellular dysfunction. Present findings are showing the accommodating nature of penis in boar towards their functional aspect.

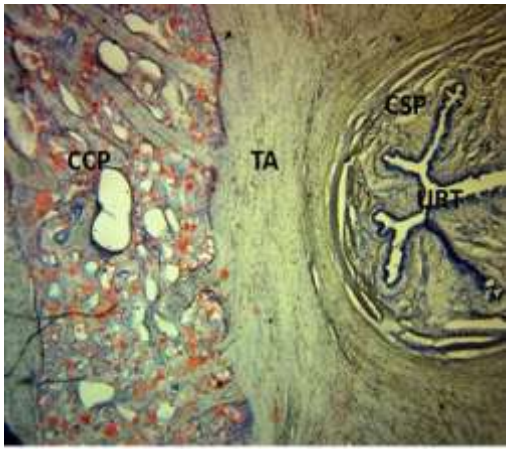

Fig.5: Photomicrograph showing Oil Red O activity in root of boar penis. OIL RED 'O' 10x. Tunica aibuginea (TA), Corpus cavernosum penis (CCP), Urethra (URT) and Corpus spongiosum penis (CSP)

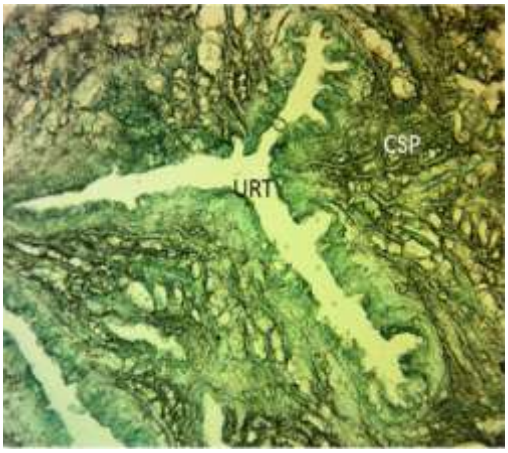

Fig.6: Photomicrograph showing Succinic Dehydrogenase activity in root of boar penis. SDH 40x. Urethra (URT), Corpus spongiosum penis (CSP).

SDH activity was intense (Fig. 6) in the tunica albuginea of corpus spongiosum, cavernosum and mucosa of urethra and urethral glands at root of the penis. SDH reaction was seen as black patches against green background, which is partially resembling SDH activity in the cytoplasm of the urethral glands of camel (Ali *et al*., 1976). The intense succinic dehydrogenase activity which shown presence at tunica albuginea of corpus spongiosum, cavernosum and mucosa of urethra and urethral glands at root of the penis is not only sufficiently supporting the sensing of oxygen level but also it helps to restrain the mutational development.

Conclusion

The present study was conducted to know the location and intensity of enzymes in the root, body and tip of the healthy boar penis. These findings are helpful in the diagnosis of pathological conditions related to the penis of the boar.

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