



ANATOMICAL STUDY OF TEAT IN NON-DESCRIPT GOATS OF MAHARASHTRA REGION IN LACTATING AND DRY STAGE

Modekar Shilpa S., Dhande, P. L., Nagvekar A. S. and Mesbram P. V.

Bombay Veterinary College, Parel, Mumbai-12

¹Modekar Shilpa S.: Assistant Prof. Dept. of Anatomy and Histology,

²Dhande, P. L. Professor & Head, Dept. of Veterinary Anatomy and Histology,

³Nagvekar A. S., Assist. Prof., Dept. of Vet. Physiology and

⁴Mesbram P. V. Assit. Prof., Dept. of Vety. Physiology

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Abstract: The gross and microscopic anatomical study was conducted on the teat of 30 non-descript goat. It was observed that the teat of goat were symmetrical in size and were teats were conical in shape, wide at the base and protruded out like a funnel from the udder. The length, diameter of the teats at mid-point and length were seen to be increased in the lactating stage as compared to dry stage. Histological observations exhibited similar disposition in both lactating teats as well as teats of goat in dry stage. The teats overall comprised of teat canal, Furstenberg's rosette and streak canal. Close to the tip of teat, the epithelial lining was of stratified cornified squamous epithelium. The teat canal epithelium was thicker than that of skin epithelium. The epithelium of teat canal in lactating stage was of stratified columnar types.

Key words: Histomorphology, lactating stage, dry stage, goat teat.

Introduction

Mammary gland are unique organs developed for the nursing of newborn and off-springs. Two mammary glands form an udder in goats. The udder is covered with hairs. Each mammary gland had one teat opening. The teat which are otherwise known as *Papilla mammae* and the teat canal is the narrowest part of udder through which milk must flow during milk removal. The teat canal is provided with keratin which, between milking, acts as a barrier for the pathogenic bacteria. The study of teat of goat is not only of important as far as conduction or outlet of milk produced, but also its study plays major role in protection against mastitis. The complete anatomical and microscopical picture of teat of goat may be helpful to understand the pathological lesions and alterations in goat. The present study was undertaken to investigate the gross and microscopic anatomical structure of teat in non-descript goats of Maharashtra specifically in dry and lactating stage. The gross anatomical parameters of teat like, teat length (Distance between base and tip), teat diameter at base as well as tip, inter-teat distance at base were

recorded in normal and healthy goats. The samples were collected for histological study from the Deonar Abattoir located near Chembur, Mumbai (Maharashtra State).

Materials and Methods

The gross and microscopic anatomical studies on the teat of goat were conducted on 30 non-descript goat of which, 15 were in their first lactation and 15 were in their dry stage after first weaning. Before conducting the biometrical observations, the health status, normal body structure, age parity and condition of their external genitalia were observed for their normalcy. The gross biometrical observations were done with Vernier Caliper. Whereas for the histological examinations, the tissue pieces were collected from the base and apex of the teat and processed by routine procedures and were fixed in 10% neutral buttered formalin. After fixation of tissue for 24-72 hrs in fixative, the tissue were subjected to dehydration in the ascending grades of alcohol, cleared in xylene and infiltrated with paraffin wax as per the method of Drury and Wallington (1980). Tissue blocks were prepared and

4-7 μ m thick sections were cut with the help of microtome, mounted on clean albumenized glass slides, and dried on a hot plate at 45-50°C for 2-3hrs. Sections were stained and observations were recorded.

Results and Discussion

The teats in the mammary gland of she goat were symmetrical in shape and size. These teats were conical in shape, wide at the base and protruded out like a funnel from the udder. The teats were directed latero-ventrally. The teats length, diameter of the teats at their mid-point and inter-teat distance increased in the lactating stage as compared to the dry state. The average inter-teat distance in dry state recorded was 5.66 ± 0.08 cm and in lactating state were 7.401 ± 0.05 cm. Average diameter of teats at their mid-point in dry state recorded was 0.89 ± 0.05 cm, where as it was 3.57 ± 0.11 cm in lactating state. And the average length of teats recorded from mammary gland in dry state was 13.97 ± 0.13 cm and in lactating stage it was 14.09 ± 0.20 cm.

Histologically the teat in lactating as well as dry state had the similar structure. The wall of teat consisted of three layers: epidermis, dermis, subcutaneous tissue and mucous membrane. The first layer of skin, the most outer layer is the normal skin formed from epidermis and dermis had few fine hairs usually associated with clusters of sebaceous glands surrounding the hair follicles. The hair were absent at the tip of the teats. The teat of goat comprised of teat canal, Furstenberg's rosette and streak canal as reported in buffalo (Singh 2000). The teat canal is surrounded by bundles of smooth muscle fibers. Fibers were arranged longitudinally immediately adjacent to the epithelial lining and in a circular fashion around the canal deeper in the connective tissue. The teat duct, stratified squamous epithelium that was transformed into two cell layered cuboidal epithelium at teat cistern, whereas in the area between teat duct and teat cistern, increased number of lymphocytes and plasma cells were observed within the chorium, in the lactating stage.

Between milkings the smooth muscles function to keep the teat canal closed. The circular

smooth muscles in their contracted state function to maintain tight closure of the canal between milking to prevent leakage and to keep keratin occluding the canal lumen compressed as an aid in preventing bacteria from progressing upward into the teat cistern. Hair follicles, sebaceous glands and sweat glands surrounded by myo-epithelial cells were seen as an important and measure feature of dermis. The number of gland were seen increased in the teats of lactating goats.

The second layer was the fibromuscular layer which was thick layer and formed most of the thickness of the teat wall, it was composed mainly of dense connective tissue made of bundles of collagen fibers, fibroblast and elastic fibers, blood vessels and there were numerous small clusters of accessory glands especially at the base of the teat. The gland cistern emptied ventrally into the teat cistern, and, at their union, there may be a slight constriction known as the annular fold. The gland sinus appeared as branching ducts which were lined by stratified cuboidal epithelium during different age groups of goat. It further continued downwards as teat canal, which was fully formed and lined by stratified columnar epithelium in lactating teat. It was seen as stratified cornified squamous epithelium close to the tip of teats. Sulochana (1983) observed that in ewes the teat canal was lined by stratified cornified squamous epithelium surrounded by vascular zone in lamina propria. In lactating goats the sub-epithelial stroma contained connective tissue cells and the elastic fibers became much coarser in stromal tissue.

The third and inner most layer was the epithelial lining of the teat sinus and teat orifice. The streak canal constituted the distal part of duct system and was lined by the epithelium extending from the epidermis of the teat. The streak canal was lined by stratified squamous keratinized lined by stratified squamous keratinized epithelium (Kausaret *al* 2001). The lining of streak canal was seen changing from stratified squamous keratinized to double cell layered cuboidal epithelium on the Furstenberg's rosette. This rosette is reported to play an important role in protecting mammary tissue from invading pathogens.

It was observed that the sub-epithelial stroma of these Furtenberg's rosette, thrown into primary and secondary folds projecting into lumen. Celik and Asti (1992) also reported that there was a remarkable increase in plasma cell population in the epithelium and sub-epithelial connective tissue of the Furstenberg's rosette. Mast cell and polymorphonuclear leukocytes were also seen. The sub-epithelial stroma of streak canal in both lactating as well as dry goats was composed of collagen fibers with few elastic as well as reticular fibers. The reticular fibers formed the basement membrane of epithelium. The accessory lactiferous glands were well developed in

lactating teats. Similar findings were reported by Parmasivan *et al* (2013)

The epithelium was surrounded by sphincter made up of thick smooth muscle bundles in lactating goats. The teat canal was surrounded by bundles of smooth muscle fibers. Fibers were arranged longitudinally immediately adjacent to the epithelial lining and in a circular fashion around the canal deeper in the connective tissue. The circular smooth muscles in their contracted state function to maintain tight closure of the canal between milking to prevent leakage and to keep keratin occluding the canal lumen compressed as an aid in preventing bacteria from progressing upward into the teat cistern.

Picture Gallery

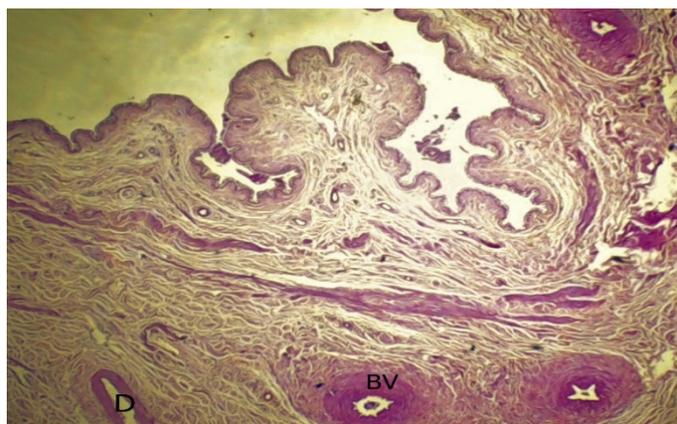


Fig.1: Photomicrograph of goat teat in lactating stage, showing the lumen of teat, BV: Blood vessel, D: Duct, smooth muscle bundles and increased of collagen and elastic fibers. (Hematoxilin and Eosin Stain100x)

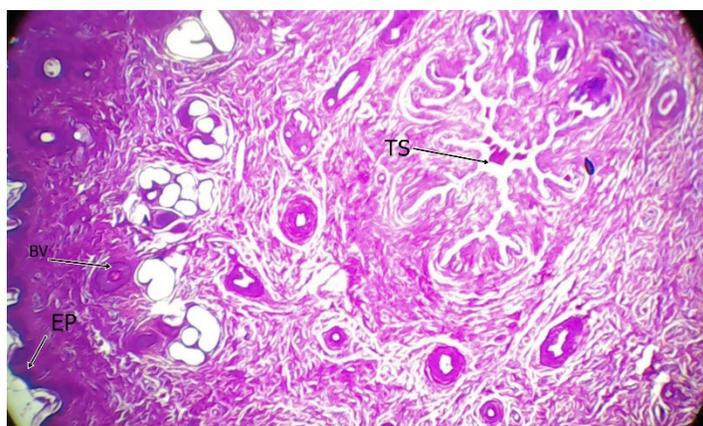


Fig. 2: Photomicrograph of goat teat in dry stage showing, TS: Teat canal, BV: Blood vessel, EP: Stratified Squamous Epithelium. (Hematoxilin and Eosin Stain100x)

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