

## ***DEDICATION***

***Praise and glory to Allah in the first and the last***

***Then***

***To my soul mate Mouawia...***

***To my precious mother Awatif Mohamed...***

***To my beloved father ELMAHDI...***

***To my brothers Hosham, Husamand***

***Aboalabass...***

***To my beloved sister Wiam...***

***To my little angels Rehamand Rahf...***

***With great love***

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## Abstract

This study aimed to investigate the seasonal gross anatomy, histology, histometry and histochemistry of the camel lacrimal apparatus. One hundred and twenty five heads from both sexes of healthy adult dromedary camels were collected from Omdurman and Tambul slaughterhouses.

The camel lacrimal gland was located at the dorsolateral part of the eyeball and convex dorsally and concave ventrally. The gland which was light red in colour was lobulated and irregularly triangular in shape with three borders; in some specimens was observed a ventral accessory lobe.

There were insignificant seasonal differences in the glandular weight, length, width and thickness ( $P > 0.05$ ). However, there was a significant difference in Summer between the thickness of the right and left glands ( $P < 0.05$ ).

The excretory duct penetrated the periorbita and opened into the superior conjunctiva. The main lacrimal gland had two excretory ducts and the accessory lobe had its own duct. No punctalacrimalia were found and the two lacrimal ducts started blindly and opened into the lacrimal sac. The nasolacrimal duct extended from the lacrimal sac to its external opening which was located at the ventral part of the opening of the nasal diverticulum and dorsal to the Vomer bone.

The lacrimal gland was surrounded by a thick connective tissue capsule which sent connective tissue septa that divided the gland into lobes and lobules. The gland was tubuloalveolar in structure. The alveoli and tubules were lined by simple cuboidal epithelium which was surrounded by myoepithelial cells.

The intralobular duct was lined by low simple columnar epithelium. The interstitium was formed of loose connective tissue around the acini, tubules and intralobular ducts. The secretory units and intralobular ducts were also surrounded

by a thin layer of reticular fibres. The interlobular duct was lined by simple to stratified columnar epithelium. The excretory duct was lined by stratified columnar epithelium. The interlobular and excretory ducts had many large goblet cells and surrounded by connective tissue containing blood vessels, nerve fibres and adipose tissue. The lacrimal duct and lacrimal sac had an irregular mucosa and were lined by stratified columnar epithelium containing large goblet cells and surrounded by a dense connective tissue containing smooth muscles, irregular blood vessels (venous plexuses) and lymphocytes. The nasolacrimal duct was lined by a stratified columnar epithelium with goblet cells. The goblet cells and mucoserous glands in the vascular connective tissue increased towards the terminal part of the gland.

No significant difference was observed in the glandular epithelial height, diameter of secretory unit's and interstitial tissue thickness between Winter and Summer.

The acini were generally Alcian blue (pH-2.5) negative and the reactions in the tubules, intralobular ducts, interlobular ducts and excretory ducts were strongly positive. The reaction intensity increased in the different glandular tissue in Summer season. The glandular acini, tubules, intralobular ducts, interlobular ducts, excretory ducts and connective tissue septa were strongly PAS positive and the reaction was comparatively stronger in Summer. alcian blue/ PAS sequence showed strong PAS reaction in the tubules and intralobular duct, whereas alcian blue was observed in a few epithelial cells. The epithelial cells of the acini were only PAS positive. Strongly positive alcian blue reaction was observed in many goblet cells of the interlobular and excretory ducts; some cells showed mixed alcian blue and PAS reaction. The intensity of these reactions increased in Summer as compared to Winter season. The acidic tubular lacrimal mucins were mainly carboxylated in Winter and the acidic acinar mucins are mainly sulphated in Summer. Glycogen was absent from the lacrimal gland in Winter and Summer.

## المستخلص

هدفت الدراسة لاجراء هذا البحث دراسة التشريح العياني والمجهري، والقياسي النسيجي والكيمياء النسيجية الموسمية على الجهاز الدمعي للابل. اجريت هذه الدراسة على مائة وخمسة وعشرين راسا من الابل وحيدة السنام البالغة والخالية من الامراض من كلا الجنسين والتي جمعت من مسلخي ام درمان وتمبول.

تقع الغدة الدمعية للابل على الجزء الجانبي العلوى لمقلة العينوتكون محدبة ظهريا ومقعرة بطنيا. وجد ان لون الغدة احمر فاتح وهي مفصصة ومثلثة وغير منتظمة الشكل وبها ثلاثة حواف، وكان هنالك فى بعض العينات فص اضافى بطنيا. لم تكن هنالك اختلافات معنوية موسمية في الوزن والطول والسلك والعرض للغدة ، ولكن وجد اختلاف معنوي فى السلك بين الغدة اليمنى واليسرى فى فصل الصيف.القنوات الافراغية تخترق الانسجة المحيطة للحجاج لتفتح فى الجفن العلوى، تحتوى الغدة الدمعية الرئيسية على اثنين من القنوات الافراغية، ويحتوى الفص الاضافى على قناة واحدة. لا توجد نقطة دمعية والقناتان الدمعيتان تبدان كقناتين مغلقتين من جانب وتفتحان فى الكيس الدمعي.تمتد القناة الانفية الدمعية من الكيس الدمعي الى الفتحة الخارجية، التى تقع بطنيا لفتحة الرتج الانفى وظهريا للعظم الميكي.

تحاط الغدة الدمعية بمحفظة من النسيج الضام الكثيف التى تمتد منها حواجز تقسم الغدة الى فصوص وفصيصات. الغدة انبوية سنخية فى التركيب ، الاسناخ والنبيبات تبطن بظهارة مكعبانية بسيطة ومحاطة بخلايا طلائية عضلية. بطنت القناة داخل الفصيصات بظهارة عمودية بسيطة منخفضة. يتكون النسيج البيني من نسيج نضام رخو حول الاسناخ والنبيبات والقنوات داخل الفصيصات. الوحدات الافرازية والقنوات داخل الفصيصات احيطت بطبقة رقيقة من الالياف الشبكية. بطنت القناة بين الفصيصات بظهارة عمودية بسيطة الى عمودية مطبقة والقناة الافراغية بظهارة عمودية مطبقة. احتوت القناة بين الفصيصات والقناة الافراغية على خلايا كاسية كبيرة عديدة احيطت بنسيج ضام يحتوى على اوعية دموية ، الياف عصبية ونسيج دهنى.

احتوت القناة الدمعية والكيس الدمعي على غشاء مخاطى غير منتظم ، وبطنا بظهارة عمودية مطبقة بها خلايا كاسية كبيرة محاطة بنسيج ضام كثيف احتوى على خلايا عضلية ملساء واوعية دموية غير منتظمة (ضفاير وريدية) و خلايا ليمفاوية.

القناة الانفية الدمعية بطنت بظهارة عمودية مطبقة بها خلايا كاسية. زادت الخلايا الكاسية والغدد المصلية المخاطية بالنسيج الضام الوعائى نحو الجزء الطرفي من الغدة.

لوحظ عدم وجود فرق في ارتفاع الظهارة وقطرالوحدات الافرازية وسمك الأنسجة البينية للغدة الدمعية بين فصلي الشتاء والصيف.

اظهرت صبغة الالشيان الازرق تفاعلا سلبيا في الاسناخ بشكل عام وتفاعلا قويا مع الانابيب والقنوات داخل الفصيصات والقنوات بين الفصيصات والقنوات الافراغية ، كما لوحظ زيادة كثافة التفاعل فى فصل الصيف فى الانسجة الغدية المختلفة. ظهر تفاعل ايجابي قوى لصبغة ال PAS فى الاسناخ والانابيب والقنوات داخل الفصيصات والقنوات بين الفصيصات والقنوات الافراغية وحواجز النسيج الضام للغدة الدمعية وكان التفاعل قويا نسبيا فى فصل الصيف. تتابع صبغتي الالشيان الازرق و PAS اظهرا تفاعلا ايجابيا قويا فى الانبيبات والقنوات داخل الفصيصات لصبغة الالشيان الازرق ، بينما لوحظ تفاعل الالشيان الازرق فى القليل من الخلايا الظهارية. الخلايا الظهارية للاسناخ تفاعلت فقط مع PAS.

لوحظ تفاعل ايجابي اقوى لصبغة الالشيان الازرق فى العديد من الخلايا الكاسية للقنوات بين الفصيصات والقنوات المفرغة كما شوهد فى بعض الخلايا تفاعل خليط لصبغتي الالشيان الازرق و PAS . لوحظ زيادة كثافة هذه التفاعلات فى فصل الصيف مقارنة بالشتاء.

اظهرت الدراسة ان نوع حمض الميوسين الموجود فى الانابيب الدمعية غالبا كاربوكسيلات فى فصل الشتاء والمخاط الحمضى فى الاسناخ غالبا كبريتى فى فصل الصيف. لوحظ فى فصلي الشتاء والصيف عدم احتواء الغدة الدمعية على جلايوجين.

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