Histological Study for Skin of Horse

Ali Khudheyer Obayes

Biology Dept. , College of Education , University of Samarra , Samarra , Iraq

Abstract

The present study was done on skin of horse,samples are taken from six animals after anaesthetized the animals and slaughttered . Samples are taken from dorsal back area ,the collected tissues were fixed in 10% formalin for 24 hrs. tissue was prepared for light microscopic examination . the result showed skin of horse composed of Epidermis & dermis .epidermis are keratinized stratified squamous epithelium ,that divided into four cellular layers from the top (stratum corneum ,granulosum ,spinosum and basale), stratum basale are consist of simple cubiodal epithelium cells were rest on the basement membrane, Melanocytes cells are located in stratum basale .Dermis composed of papillary layer and dermal papilla. Papillary layer composed of bundles of collagenouse fibers with fibroblast. Primary hair follicles. primary hair follicle which surrounded by sweat glads and sebaceous glands. sweat glands was simple tubular gland which lined by simple cuboidal epithelium, the alveoli of sweat gland that surrounded by Myoepithelial cells. Sebeceous gland, Like double saccule, lined by simple cubiodal epithelium cells that contain fat dropletes. Primary hair follicle, that consist of Hair shaft in the center which represented the medulla, it was enclosed by cortical layer of stratified squamous epithelium.The primary & secondary hair follicle were attached to the smooth muscle bundles, was represented the arector pilli muscles. Small artery near the hair follicle that supply the oxygen and nutrient to the skin.

Introduction:

The skin in mammals is the largest organ of the body, skin in horse provides anatomical and physiological barrier between external and internal environment , that act as thermoregu- lation , sensation (touch, pain) and pigmentation[1,2]. Skin of horse like other mammals comprise Epiderms, Dermis and Hypodermis. Epidremis that originated from ectoderm is stratified squamous epithelium that subdivided into four strata (stratum basale , spinosum , granilosum and corneum) ,that undergo a pattren of proliferation and keratinizatio, [3]. The average turnover time for horses epidermal to be shed and repalsed are 17 days,[4].

Dermis are originated from the mesodermis ,was composed of denes connective tissue that contain a bundles of collagen, elastin and reticular fibers ,in horse dermis are divided into papillary layer (superficial layer), that lay down Epidermis and reticular layer (deep dermis), [2,5] in all mammals the appendages of skin that invaginate the dermis such as hair follicle, sebaceous gland and sweat gland they provide specialized physiological functions to individuals [6].

Recent study on skins of domestic, wild animal are be done such as primates skin[7] , the skin of pig are the best model for human skins,its comprises epidermis , dermis and hypodermis, the epidermis have five strata [8], in goat epidermis have four strata ,while in deer only three epidermal strata [9].

In Ostrich the epidermis are divided into four strata [10]. In thi native cow has a thin epidermis,small sweat glands and gaint hair follicles [11]. So the epidermis are differ from one ani- mal to another .

Horse sweat glands are well develo- ped and most numrouse , the apocrin sweat glands when empty into hair follicle and eccrine which open into the skin surface , [12]. in dromedary camel sweat glands are tubular and lined by columinar to hight cubiodal cells or sometimes flat epithelium [13], and simple coiled , tubulo acinar sweat gland that associated with primary hair follicles in goat [14]. The sebace- ous gland in domestic animal has state simple branched or compound alveolar [15] .

The aim of the present study to focused the light on horse skin and revealed some characteristics structure of Epidermis and Dermis and there appendages.

Materials and methods :

The present study was done in laboratory of anatomy, veterinary college in university of kufa. Skin samples were taken from six horses at dorsal back areas, horse were anaesthetized and slaughttered by bleeding method. the collected samples were removed the hair from skin and fixed in 10% formalin, dehydrated through graded alcohol series (30-100%) , cleared in xylene and embedded in paraffin wax. Sections of six micrometer thickness were prepared and stained with Haematoxylin & Eosin (H&E) [12, 16]. Photomicrographs of stained sections were taken using light microscope (Leica ,Germany) attached to digital camera (Pixelink , Canada) .

Results :

The histological examination at the skin of horse revealed, Epidermis (E) was covered by keratinized stratified squamous epithelium .Dermal papilla(D) . Superficial papillary layer (SP) formed a continuous subepidermal layer that surroun ded the hair shaft. Papillary layer (PL) in the dermis consist of collagen bundles fibers. primary hair follicle (phf), which surrounded by sebaceous gland (sg) , and secondary hair follicle (shf) with out sebeceous gland . (fig .1)

Another specimen revealed epidermis stratum and papillary layer (PL) of dermis in horse skin, the epidermis stratum composed of stratum corneum (SC). stratum granulosum (SG). Melanocytes (MC) or pigment cells . and stratum basale (Sb) consist of simple cubiodal cells rest on the basement membrane . under the epidermis there is papillary layer of dermis composed of bundles of collagenouse fibers

(CF) with fibroblast (FB) and Fibrocytes (CF). (fig. 2) .

The horse of skin was appeared the protrustion of superficial layer of horse dermis into the epidermis , and formed the subepi- dermal layer that surrounded the Hair Shaft (Hs). The Stratum Cornium (SC) consist of cornified cells with out nuclei .The papillary layer (PL) which surrounded the epidermis papilla (EP) composed of collageneous fibers (CF), Fibrob- last (Fb) and Mast cell (M) . (fig. 3) .

The primary hair follicle (Phf) in the dermis horse skin ,was consist of Hair shaft (HS) in the center which represented the medulla , its enclosed by cortical layer (CL) , its consist of stratified squamous epithelium. Sebeceous gland (Sg) , Like double saccule , composed of cubiodal cells that contain fat dropletes (Fd). The hair follicle was attached with smooth muscle bundles fibers was represented the arector Pilli (EP). (fig. 3) .

Other specimen was revealed the horse dermis were contained primary hair follicle (phf), consist of hair shaft (HS), the hair follicle was surrounded by sebaceous gland (Sg). arector pili muscle (Ep) connect to the hair follicle. The sweat gland (Sw) adjacent to the primary hair follicle , the sweat gland was simple gland which lined by simple cuboidal epith- elium, the alveoli of sweat gland that surrounded by Myoepithelial cells (Me). (fig. 5) .

Finaly, Figure (6) , of the skin was showing dermis, composed of secondary hair follicle (Shf) , the arector pilli muscle (Ep), attached to secondary hair follicle, the pigment cells or Melanocytes (M) was distributed in the cortical layer (CL) of hair follicle (Hf) . There was Small Artery (SA) near the hair follicle and the collagen fibers (CF) bundles were distrbuted around the small artery and secondary hair follicle.

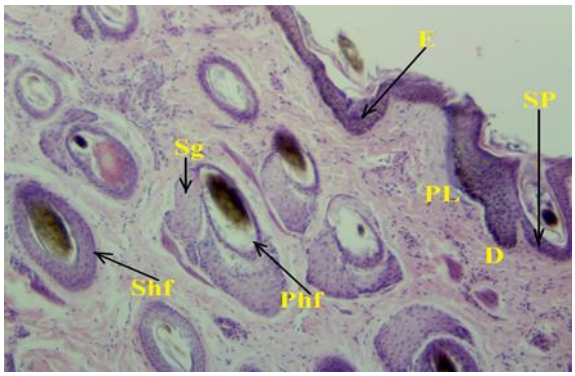

Figure (1): Showed skin of horse, Epidermis[E], Dermis [D];Superficial papillary layer [Sp] ;Papillary layer [Pl], Primary hair follicle [Phf] and Sebaceous gland [Sg]. H&E: 200X .

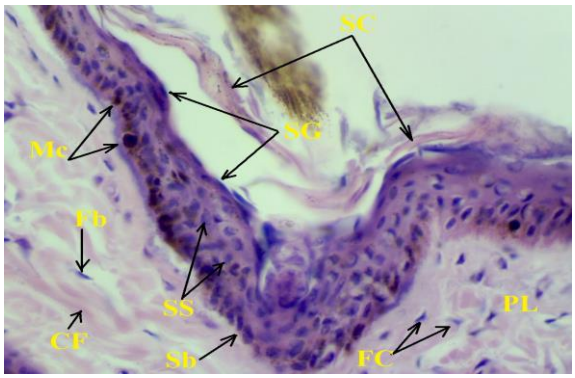

Figure (2) : Revealed Epidermis , stratum and Papillary layer [PL] ; Stratum cornium [Sc]; Stratum granulosum [SG]; Srtatum Spinosum [SS]; Melanocytes [Mc]; Stratum basale [Sb]; Fibroblast [Fb]; Collagenous fibers [Cf] and Fibrocyte [FC]. H&E : 400X .

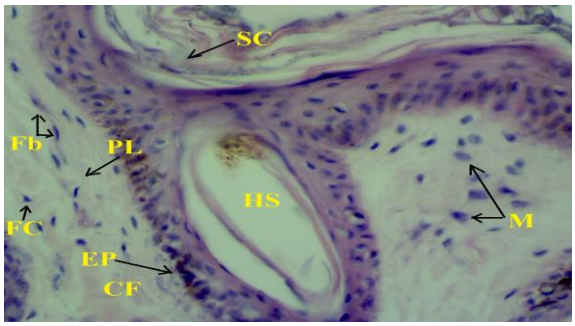

Figure (3) :Horse skin showed Hair Shaft[HS] ; Stratum Cornium [SC] ; Papillary layer [PL]; arector pilli muscle[Ep]; Fibroblast [Fb]; Collagenous fibers [CF] and Fibrocyte [FC] and Mast cells [M]; H&E : 400X .

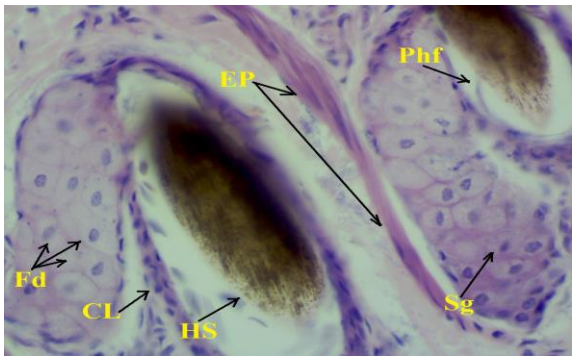

Figure (4): Horse skin showed Hair Shaft [HS]; Primary hair follicle [Phf]; Cortical Layer [CL]; Sebaceous gland [Sg]; Fat Sebum [Fd]; arector Pilli muscle [EP]; H&E:400X .

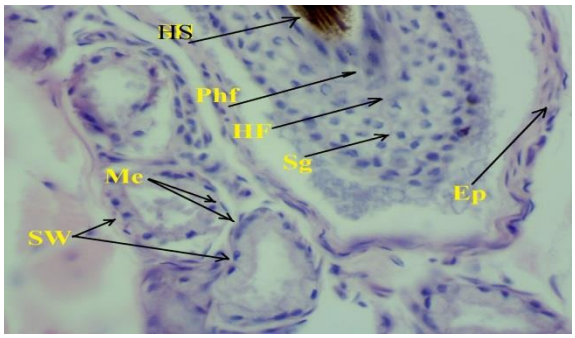

Figure (5): Horse skin showed Hair Follicle[HF]; primary hair follicle[Phf]; arector Pilli muscle [EP]; Hair Shaft[HS]; Sweat gland [Sw] ; Myoepithelial cells [Me] H&E: 400X .

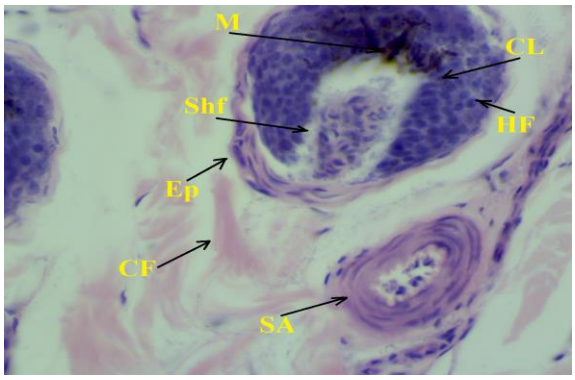

Figure (6): Horse skin showed Secondary hair follicle [Shf]; arector Pilli muscle [EP]; Melanocytes [M]; Cortical layer [CL] of Hair follicle[HF]; Hair Shaft[HS]; Small Artery [SA];Collagen fibers [Cf]; H&E: 400X .

Discussion:

The present study was revealed the skin of horse are represented into Epidermis and Dermis, the Epidermis was covered by keratinized stratified squamous epithelium subdivided into four strata from the deep (stratum basale, spinosum, granulosum and corneum), the stratum basale was simple cuboidal cells rest on basement membrane ,the stratum corneum are squamous dead cells. In cattle, goat and ostrich are resemble the horse skin in epidermis layers number have four strata ,but in wild spotted deer the epidermis have three stratum layers (stratum basale, spinosum and corneum), [9,10]. horse epidermis cells layers are differ than epidermis in porcine and bama pigs, it was have five strata (stratum basale, spinosum , granulosum , lucidum and conium), stratum basale was columnar or cuboidal cells that rest on basement membrane, [7,17].

The dermis in present study that lay under the epidermis, consisted of superficial layer that's called epider- mal papilla that continuous with sub epidermal layer , usually composed of bundles of collagenous fibers with fibrocytes. The horse dermis that subdivided into superficial dermis and the deep reticular dermis with large amount of collagen, elastin and reticular fibers bundle, the dermis are much thicker than epidermis,[3,5]. The dermis in porcine pig are subdivided into papillary layer and reticular layer, [7]. The sweat gland in present study were presented in papillary layer of dermis that adjacent to the primary follicles , sweat gland was simple tubular gland that lined by simple cuboidal epithelium , the alveoli of sweat gland that surrounded by myoepithelial cells, the scientist in previous study showed that sweat gland in horse are numerous and well developed , tubular ,coiled gland that lined that lined by columnar, high cuboidal or pyramidal cells in shape that surrounded by myoepithelial cells , they showed there are two types of sweat gland appocrin are associated with hair follicles and eccrine sweat gland that open into the skin surface [12]. Sweat gland in Dromedary camel are tubular and lined by columnar, cuboidal or flat cells in shape and the secretion have PAS positive reaction, it was similar to finding in sweat glands of horse and dog [13]. in Yorkshire pigs sweat gland are apocrine tubular, lined by simple columnar epithelium,[17]. in Bakerwali goat are simple, coiled tubule acinar sweat glands and the secretion are positive PAS reaction ,[14]. in cow sweat gland tubular coiled secreted portion, lined by simple cuboidal cells ,embedded in the dermal layer with acidophilic secretary granules in cytoplasm of glandular cells of sweat gland [18,9]. The present results Sebaceous gland like double saccule and composed of cuboidal cells. that contain fat droplets that associated with primary hair follicle. in Bakhtiari sheep the type of sebaceous gland was stated a simple, branched or compound which were always associated with primary hair follicle .the ducts gland in most regions was mainly lining by simple to stratified cuboidal epithelium, in some regions it was changed to simple squamous epithelium which open into hair follicles,[19,20]. In human sebaceous gland are associated with hair follicle that distributed throughout all the skin, that open into hair follicle and deposit sebum on hair or glabrous gland non haired area (eyelid, nose)[21]. In domestic animal the sebaceous gland secreted an oily substances in hair follicle to lubricate skin and hair, [22] .

The present results sebaceous glands are associated with primary hair follicle as reported in goat, [23], red Kandhari cows, [24]. in wild animal such as spotted deer the sebaceous gland were presented at the base of hair follicle which were divided into two major segment, [9]. The present study showed primary hair follicle that consist of hair shaft in the center which represented the medulla , its enclosed by cortical layer, its consist of stratified squamous epithelium , that surrounded by sebaceous gland, primary hair follicle was attached with the smooth bundles fibers was represented the arrector Pilli muscle, the arrector Pilli muscle are found at the base of primary and secondary hair follicles. in camel the primary hair follicles are associated by sweat glands and sebaceous gland, the arrector Pilli muscle are connected at the base of secondary hair follicles [25]. At the base of sebaceous gland the outer root sheath is continuous with epithelium as its

essentially an epidermal invagination into the dermis but cannot produce the spinous granular or cornified cells such as the epidermis. the presence of specializ- ed area on outer root sheath known as bulge area reported by some investigation as a providing attachm- ent of arrector Pilli muscle, [26,27]. there are small artery near the hair follicles , however many capillaries surrounded the hair follicles in the hypodermis , possibly to supply oxygen and nutrients to the growing hair in mice [28]. finally in the present study we found the melanocytes and Merckels cells are found in epidermal basale strata , and distributed in cortical layer of hair follicle. in human Melanocytes are neural crest- derived specialized cells found between the stratum basale cells and in hair follicles, the melanocytes cells transfer melanoso- mes into surrounding cells through their cytoplasmic processes,[29,30].

Conclusion :

The present study demonstrated that the histological structure of skin horse formed by epidermis and dermis, the epidermis formed by stratified squamous epithelium. The dermis was formed by connective tissues associated with hair follicles , sweat glands and sebaceous glands .

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دراسة نسجية لجلد الحصان

علي خضير عبيس

قسم علوم الحياة ، كلية التربية ، جامعة سامراء ، سامراء ، العراق

الملخص

أجريت الدراسة الحالية لجلد الحصان على ست حيوانات بعد تخدير الحيوانات وذبحها، أخذت العينات من المنطقة الظهرية، تم تثبيت العينات بمثبت الفورمالين بتركيز 10% لمدة 24 ساعة , تم تحضير العينات لغرض الفحص المجهري، أظهرت النتائج، ان جلد الحصان يتألف من طبقتين رئيسيتين البشرة والأدمة .البشرة عبارة عن نسج حرشفي مطبق متقرن إذ يتميز الى اربعة طبقات خلوية من الأعلى (الطبقة المتقرنة ,الحبيبية، الشائكة والطبقة القاعدية). الطبقة القاعدية تتكون من خلايا ظهارية مكعبة بسيطة تستند على الغشاء القاعدي , تحتوي الطبقة القاعدية أيضا على خلايا الميلانين. أما الأدمة تتميز الى طبقتين هما الطبقة الحليمية التي تتكون من حزم من الالياف البيضاء والخلايا المولدة للألياف والطبقة الشبكية. تحتوي الادمة على جريبات الشعر الأولية والثانوية. إذ ترافق الجريبة الأولية الغدد العرقية، والزهمية. تكون الغدد العرقية نبيبية بسيطة , مبطنة بطبقة من خلايا ظهارية مكعبة الشكل، ويحاط جسم الغدة بطبقة من خلايا ظهارية عضلية. أما الغدد الزهمية عبارة عن غدد سنخية بسيطة متفرعة مبطنة بطبقة من خلايا ظهارية مكعبة بسيطة، يحوي سايتوبلازم خلايا الغدد الزهمية على قطيرات دهنية. الجريبات الشعرية الاولية تتألف من قصبة الشعرة في الوسط المتمثلة بمنطقة اللب وتحاط بطبقة من خلايا حرشفية مطبقة التي تدعى بالقشرة. ترتبط الجريبات الاولية والثانوية بحزمة من الألياف العضلية ملساء التي تكون مُقفة الشعرة، إضافة الى وجود الأوعية الدموية الشعرية في الأدمة بالقرب من الجريبات الشعرية التي تعمل على تزويد الجلد الاوكسجين والمغذيات.