Pathological and Bacteriological study of Dog Skin Disease In Iraq Governorates

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KEYWORDS

Pathological, Bacteriological study

ABSTRACT

Askin disease is the most important organ in the body and it's the first line of defense mechanism which account 15-25% of animal total body weight current study aimed to isolation the pathogenic bacterial from dog skin in Iraq Governorates (Baghdad, Erbil, Anbar, Sulaymaniyah) During a period 6 months (January-June) 2023. 200 different breed, sex, edge dogs K9, ornamental and stray dog were examined.

Investigation the gross and microscopic pathological change with clinical signs of bacterial effected dog skin. by using diagnostic tools for that swabs are taken using a sterile cotton swab containing nutrition broth until the bacteria grow. After taking the swab, the lesion site is sterilized and a sample is taken using Biopsy punch with a diameter of 8 mm.

The swab was transferred to the laboratory to be cultured in dishes containing culture media. The samples taken by Biopsy punch were also preserved in formalin and then transferred to the tissue cutting unit to make slides. Results revealed pathogenic bacteria in media and VITEK® 2 Compact system from 200 samples 100 sample where pathogenic bacterial isolate as following 50% Staphylococcus pseudintermedius 20% Proteus Mirabilis 20% pseudomonas aeruginosa and 10% Escherichia coli clinical signs and gross lesion revealed skin allopecia, ulcer, red odema, pedunculate cauliflower nodules, dermatofibroma and Papilloma. While microscopic lesion revealed skin ulcer, hyperplasia acanthosis, hyperkeratosis, granulation tissue with apoptosis, necrosis poly and mononuclear inflammatory cells abscessation.

1. Introduction

A skin is the most important argon in the body and it's the past line Oregon for defense mechanism which account15 -25% of animal total body weight (1). Skin has several important function sensory observations, immune production, etc.… (2). Skin disease is most common due to environment of pollution (3). Food-dye toxin (4). Mineral toxin (5). and industrial chemical toxin (6).

Skin disease and dogs are the most common disorder in veterinary medicine characterized by multifaced it ology with potential contribution coming from host genetics immune disease bacterial infection myotic infection viral, parasite tumors (7). The majority of bacterial skin infection and dog caused by superficial pyoderma (8).

This infection may manifest as pustules on the skin impetigo or in the hair follicles (bacterial folliculitis) (9). epidermal collarettes, papule, pustules connected to hair follicle, alopecia and hyperpigmentation are often seen (10). diagnosis of a skin disorder is usually depending on both clinical and microscopic feature of skin disorders (11). clinic Indicator distinctive skin lesions and the exclusion of other potential causes of folliculitis are evaluated clinically. cytological investigation of the intact pustule content exudative lesion and skin debris is then use it to a shave diagnosis, skin scarping, scabies therapeutic trials, allergy testing, Endocrinopathies screens and skin biopsies My all help and diagnosis of skin disorder (12,13).

2. Methodology

Material and method

200 cases of dogs (K9, ornamental and stray) with different ages, sex and breed were investigated during the period from (January-John) 2023 the dogs collected from different Governorates in Iraq (Baghdad, Erbil, Anbar, Sulaymaniyah)

all tests (bacterial isolation VITEK® 2 Compact system and pathological examination) in current study were done the department of pathology and poultry medicine College Baghdad.

Method:

After careful gross examination samples from suspected dog infection were decking from edges and center of lesion by swab sterile, then skin biopsy punch 8mm. **(fig1)**

This method divided into two parts:

-First part file bacteriological identification by vitek2

-Second part rabidly fixed in 10% natural buffered formalin solution for histopathological examination.

Histopathological examination 100 infected fixed skin tissue samples were routinely processed samples were dehydrated by ascending grads ethanol 70-80-90 in paraffin. in microtome samples then cut at 5-mm thickened and tissue stained by routine stain hematoxylin and eosin

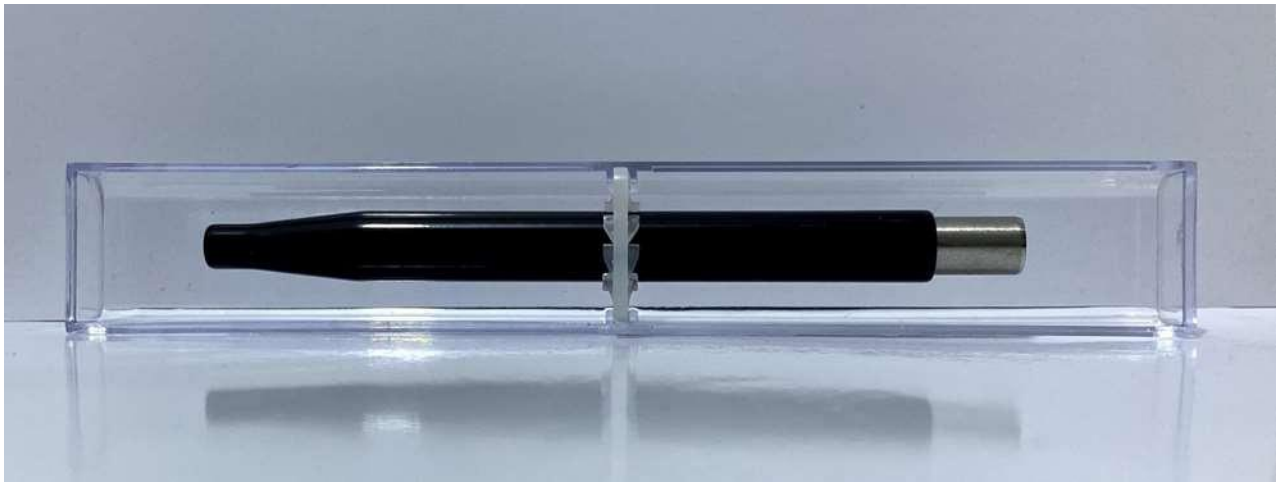

Figure 1: biopsy punch 8mm.

3. Result and Discussion

Bacterial characterization. Bacterial were isolated from dogs' skin and cultured on the blood base agar, nutrient and McConkey agar and then identification by Vitek2

With probability 98%. multiple pathogenic bacterial isolation 50% *Staphylococcus pseudintermedius*, 20% *pseudomonas aeruginosa*, 20% *Proteus Mirabilis* and 10% *E. coli.*

Clinical science and the Grassley appearance:

Skin alopecia with multiple skin ulcer on the flank and Neck. oedematose necrotic Skin, papilloma with elevated nodules on for-limbs **fig (2)**

Figure2-A: Gross section in dog skin allopecia with skin ulcer on the flank of dog isolation from skin lesion (*Aspergillus niger - pseudomonas aeruginosa)*. **Figure2-B**: dog skin Allopecia with large area of red edematous necrotic skin isolation from skin lesion (*Trichophyton Verrucosum - Staphylococcus pseudintermedius.* **Figure2-C**: dog skin Elevated well - circumscribed firm nodule round to avoid about 0.5-1cm present on for limb with necrotic surface isolation from skin lesion (*Aspergillus niger - proteus mirabilis*)

Microscopic Appearance:

Ulcer with necrotic debris, hyperplasia of sebaceous gland with mononuclear cells infiltration surrounded the skin gland **fig 3**

Skin dermal acanthosis, apoptosis cells. and mononuclear cells infiltration in dermis layer mostly microphages **fig4** complete ulceration of epidermis layer with necrotic debris, congested blood vessels and granulation tissue consist fibroblast and angioblast **fig 5**

Cystic dilation of hair follicles surrounded by mononuclear cells **fig 6**

epidermal acanthosis Was deeply eosinophilic cells, shrunken, apoptosis cells with pyknotic nuclei in the basal and spinous layer of epidermis **fig 7**

Abscess Contains large number of macrophage and lymphocytes, degenerate polymorphic cells and debris in the dermis layer **fig 8**

Multiple infected granulomas consist center of necrosis surrounded by mononuclear cells and necrotic hair follicle surrounded by mononuclear cells **fig 9**

Blood vessel surrounded by mononuclear cells in dermis layer and mononuclear cells mostly lymphocytes infiltration in dermis layer **fig 10**

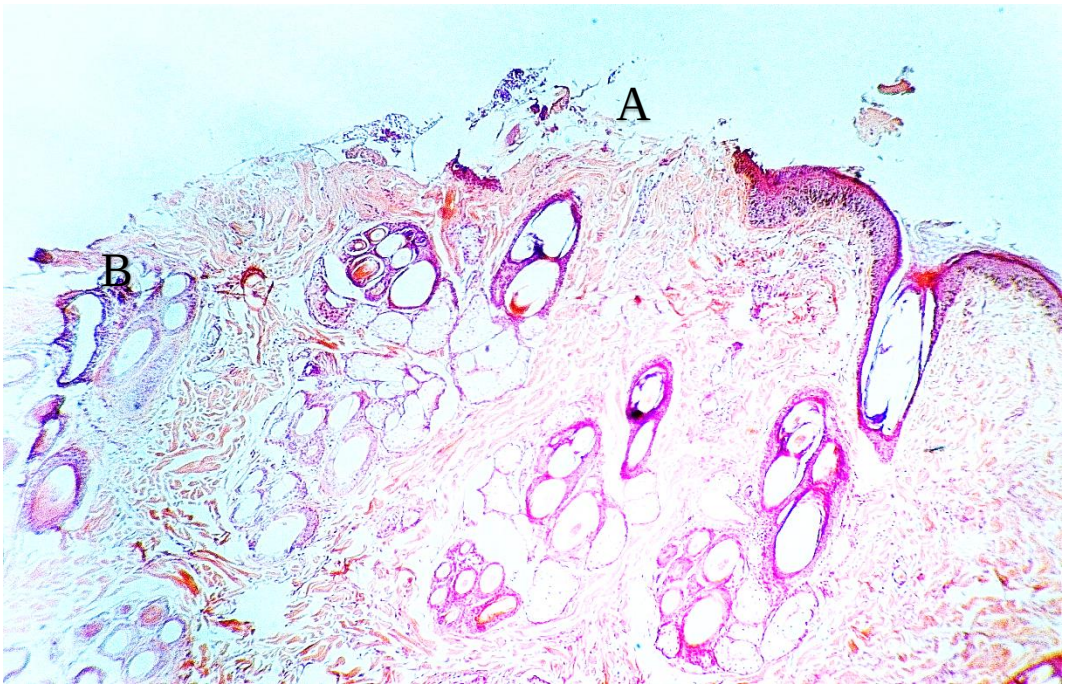

Figure 3: Microscopic section in k9 dog skin: **A:** infected epidermal layer ulcer with necrotic debris **B:** hyperplasia of sebaceous gland with mononuclear inflammatory cells surrounded the glands **(H&E stain, 200×).**

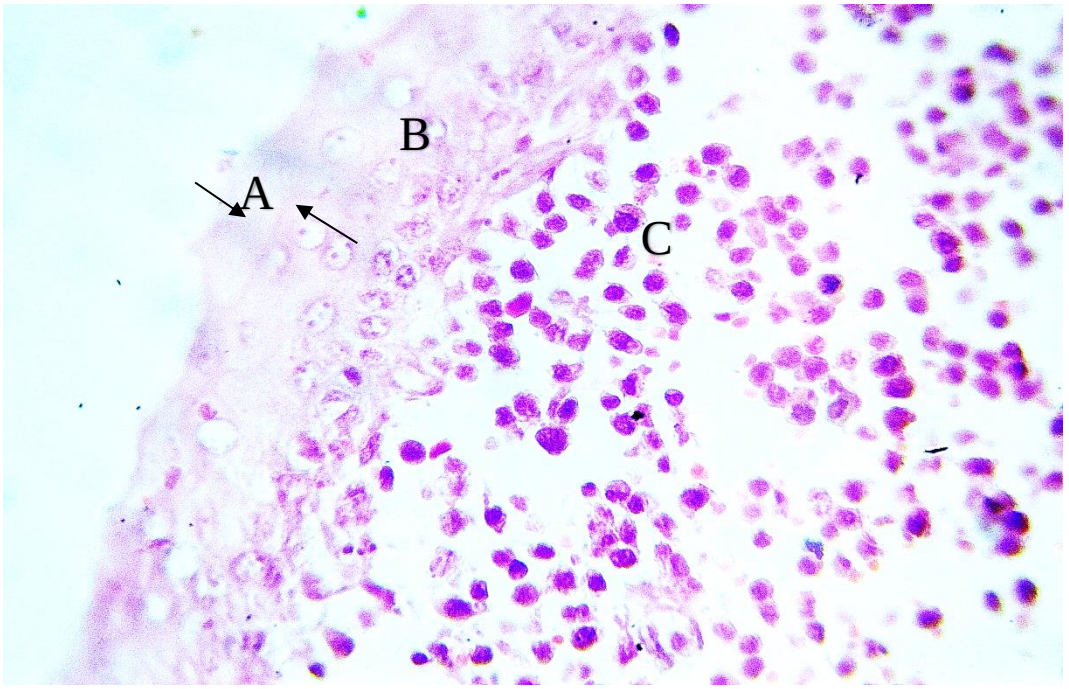

Figure 4: Microscopic section in k9 dog skin: **A:** epidermal acanthosis **B:** apoptotic cells **C:** mononuclear cells infiltration in dermis layer mostly macrophages **(H&E stain, 400×).**

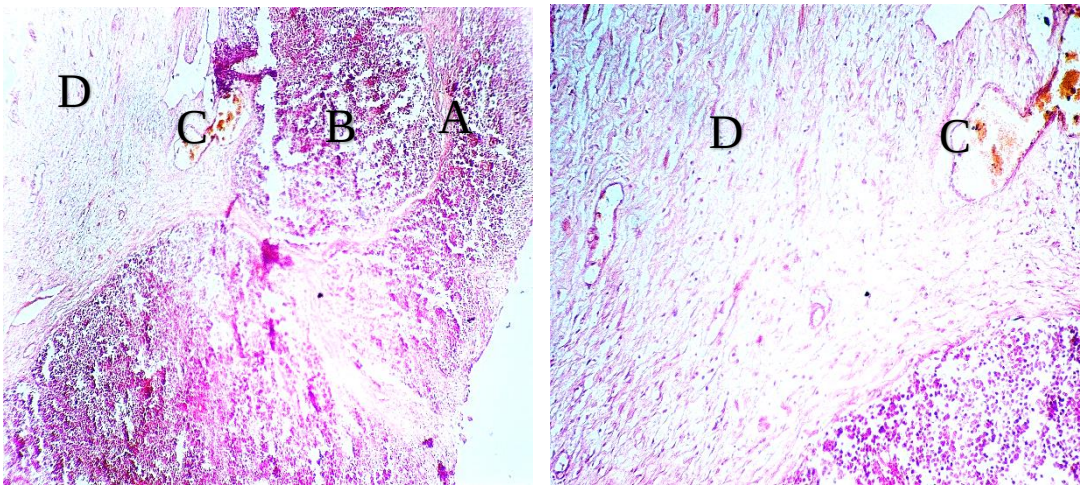

Figure 5: microscopic section in stray dog skin: **A:** complete ulceration of epidermal layer with necrotic debris, polymorphic& mononuclear cells Infiltration. **B:** dermis layer consists multiple rounded abscess with necrotic debris **C:** Congested blood vessel **D:** granulation tissue consists fibroblast and angioblast (**H&E stain, 100×,400×).**

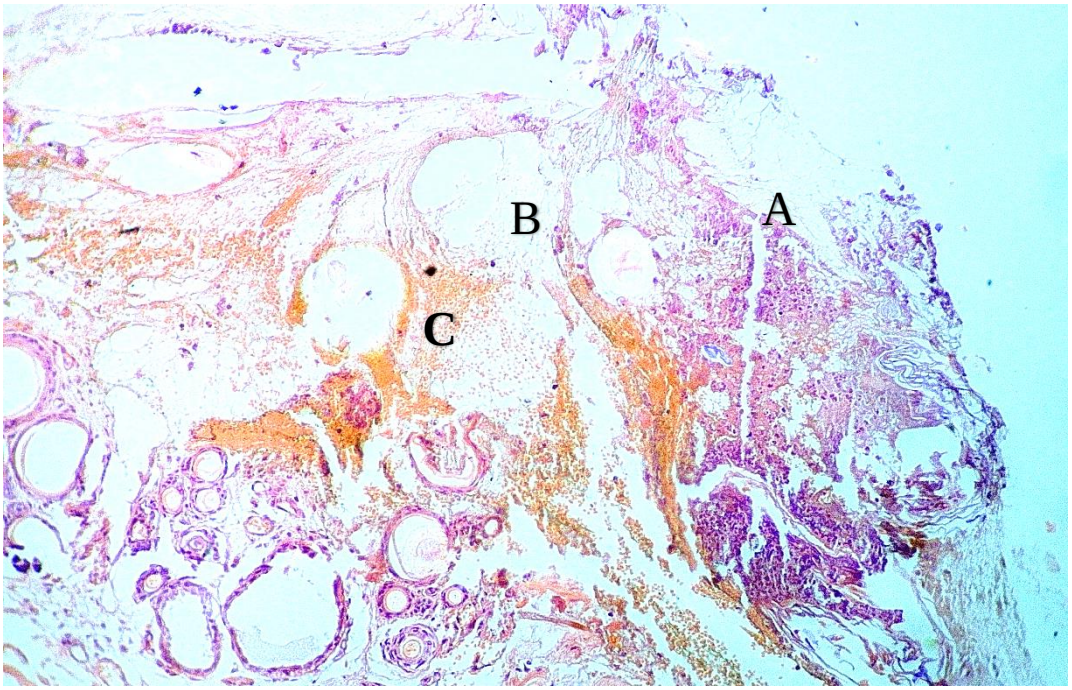

Figure 6: Microscopic section in stray dog skin: **A:** complete ulcer of epidermal layer with sever necrosis and inflammatory cells **B:** extensive dermal hemorrhage **C:** necrotic all glands and surrounded by mononuclear cells (**H&E stain, 200×).**

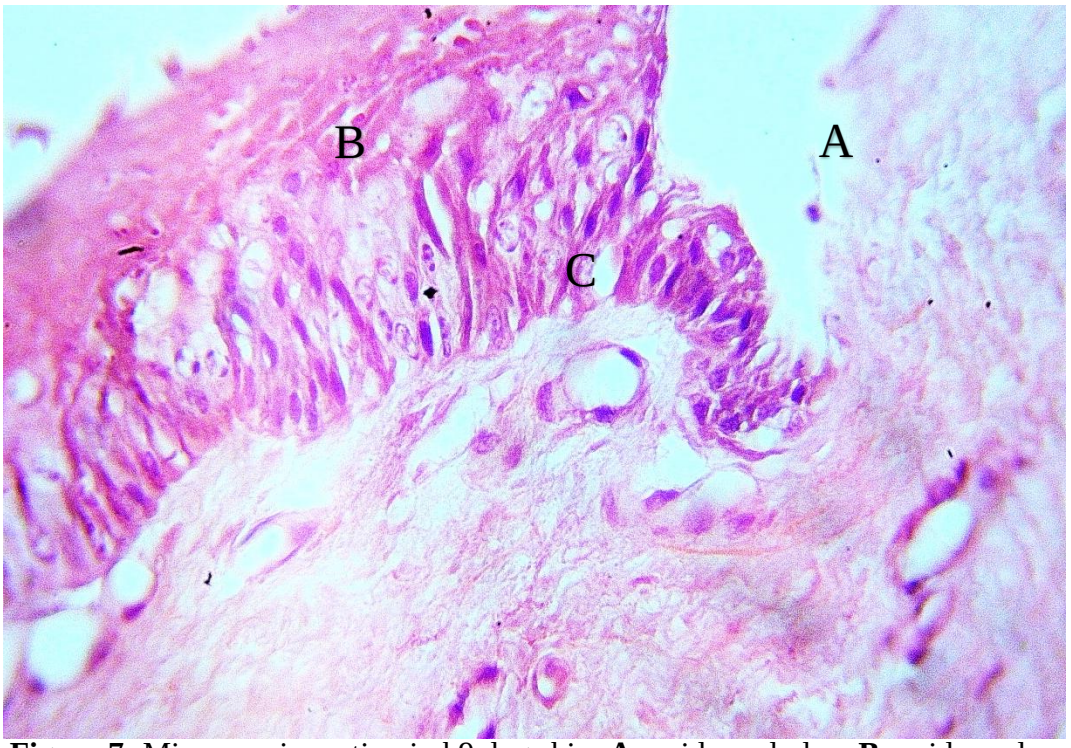

Figure 7: Microscopic section in k9 dog skin: **A:** epidermal ulcer **B:** epidermal acanthosis with vacuolar degeneration **C:** newly granulation tissue (**H&E stain, 400×).**

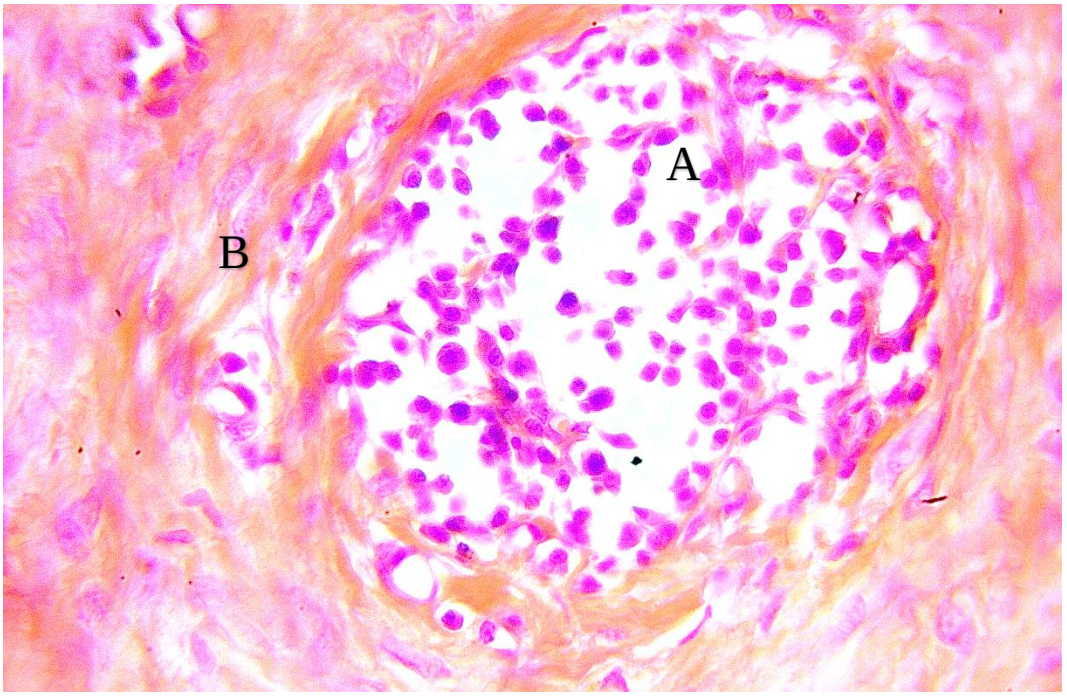

Figure 8: Microscopic section in stray dog skin: **A:** necrotic abscess contains large number of macrophage and lymphocyte, degenerate polymorphs cells and debris in the dermis layer **B:** thick collagen fiber in dermis with mononuclear cell infiltration (**H&E stain, 400×).**

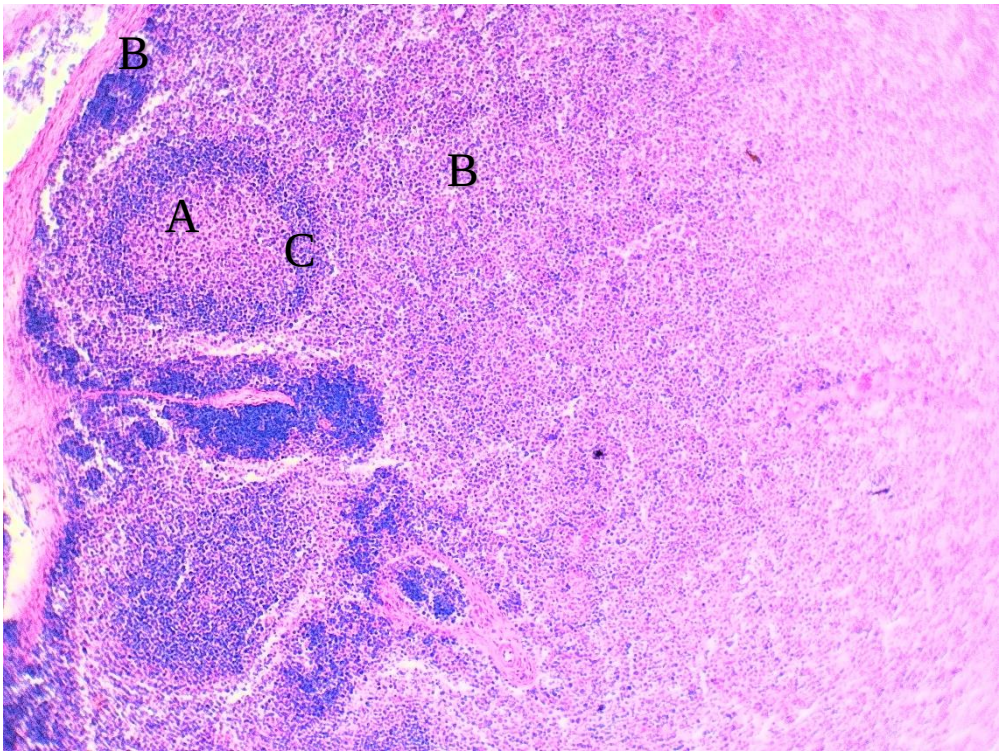

Figure 9: Microscopic section in stray dog skin: **A:** multiple infected granuloma consist center necrosis and surrounded by mononuclear cells **B:** all layer's epidermis and dermis heavily infected with mononuclear cells **C:** necrotic hair follicle with heavily mononuclear cells surrounded the follicles (**H&E stain, 200×).**

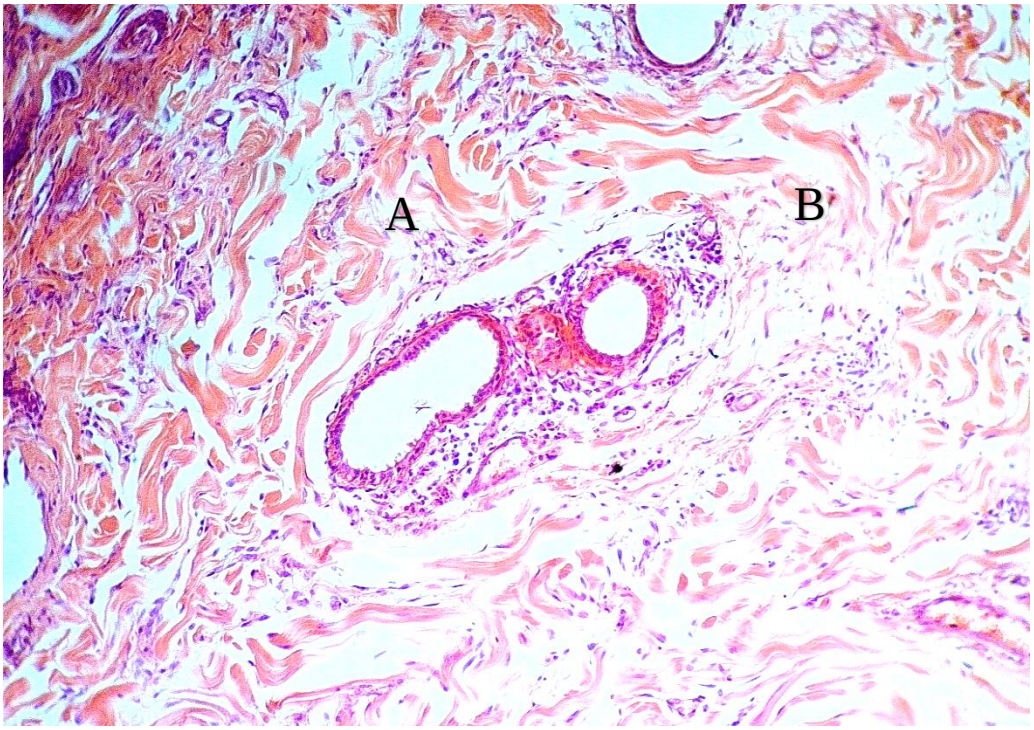

Figure 10: Microscopic Section in K9 dog skin: **A:** dilated blood vessels surrounded by mononuclear cells in dermis layer **B:** mononuclear cells mostly lymphocytes Infiltrated in dermis layer (**H&E stain, 200×).**

Discussion:

Staphylococcus pseudintermedius in current study constitutes the largest percentage 50% is normal resident of mucosal sites such as skin following dog grooming and excessive liking with pruritus and about 100% occur in puppies colonized also in oral cavity pharyngeal mucosa, perineal mucosa causing skin pyoderma and otitis (14). The bacteria responsible for sever necrotizing infection in human and dogs (15) (16).

It has intercellular cytotoxic mediated and its strong cytotoxin effect causing disrupted cells membrane which cause colonization and evasion the host immune system.

These toxin cause cell lysis, necrosis, apoptosis and polymorphic inflammatory cells infiltration. Current results agreement with (17).

Theye revealed that Staphylococcus *pseudintermedius is* the most causative agent of dog skin disease.

pseudomonas aeruginosa as one of the most problematic gram-negative nosocomial pathogens (18).

pseudomonas aeruginosa Causes species due to its pathogenicity and virulent factor it causes disrupt ATP levels in macrophage causing cytotoxicity and pression of IL-4 B IL-8 and amplification of TNF-KB signaling in current study *pseudomonas aeruginosa* constitutes 20% from 100 sample (19).

developing inflammatory processes by increase TNF-α and β concentration and peripheral blood and mitochondrial damage and dysfunction through secretion pro inflammatory cytokines Interleukin IL-18 neutrophils, key drivers are one of the first responders in the inflammatory processes followed by monocular cells as body defense against *pseudomonas aeruginosa* also present of inflammatory cells and cell damage incurrent study results presented different kind of inflammatory cells, apoptosis , congested blood vessels, necrosis with ulceration. in our study agreement with results (20,21).

Escherichia coli Gram-negative bacilli in current study constitutes 10% of sampling are unusual agent a skin in immunocompromised dogs, skin causes by wound infection, cause cellulitis, they reported *Escherichia coli* from skin and soft tissue due to surgical wounds foot ulcer, wound and fistulae our results agreement with (22,23). Causing Necrotizing fasciitis, they found liquefactive necrosis with oedema with thromboses perforating vessels so our results agreement with current study. (24) .

Results in current study reported skin folliculitis and skin abscess folliculitis is an acne like disorder due to *Escherichia coli* infection may occur due to skin injury exposure to contaminated freshwater about 80% of gram-negative bacteria causes folliculitis, superficial pustules nodular and cyst like follicles which are able to invade deeply into the skin and create pas-filled and abscesses and cyst. These lesions found on Lib skin, nose skin and cheeks in which agreement with current study. (25).

Proteus Mirabilis in current study constitutes 20% of sampling is gram-negative facultative anaerobic with swarming motility and an ability to self-elongate and secret polysaccharide with allows to attached to and move along surface like catheter intravenous lines and other medical equipment it is virulence when attachment of proteus Mirabilis to host tissue depends on activity of its Fimbriae or pili present on bacteria surface. When attached to surface of host a cascade of events initiated like Interleukin IL6 and IL8, apoptosis and epithelial cells desquamation so our Results agreement with (26,27).

Proteus Mirabilis produce endotoxin. when invading blood stream triggering host inflammatory response, causing sepsis or systemic inflammatory response system (SIRS) and skin abscessation skin repair is the blastment of lost tissue by granulation tissue, which mature to from a scar tissue wound healing is a complicated process involving money changes like movement of cells, division of cell, rearrangement of tissue and biochemical change and before healing contraction granulation tissue formation occur granulation tissue formed by proliferation and migration of the surrounding connective tissue elements composed myofibroblast and angioblast. present of infection in granulation tissue and current study decreed the healing due to pathogenic bacterial and fungal (28). *Pseudomonas*

spp. May cause abscess, odema and pyoderma with inflammatory cells as in current study and agreement with (29). deep folliculitis occurs when infection deepest portion of the hair follicle (deep folliculitis) that may lead to follicular wall rapture, and the bacterial product relays in the dermis (furunculosis) or it affect the deeper portion of the dermis and subcutaneous tissue (cellulitis) (30,31). Causing ruptured pustules and swelling (32).

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