SOME EPIDEMIOLOGICAL STUDIES ON CANINE PYODERMA

By

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ABSTRACT

A total number of 43 patient dogs of different ages, sexes and breeds involved in this study. The present search was designed to study some epidemiological aspects of canine pyoderma, clinical and bacteriological parameters in dogs. High prevalence level was recorded in German shepherd dogs (32.55%). Main clinical signs observed among examined (43) dogs were pruritus, erythema, alopecia disperse with easy hair epilating, papulo-pustular eruptions, erosive or ulcerative lesions, scaling, crusting. Other clinical signs such as otitis, foul smelling odor, anal sacculitis, draining tracts and deep wounds, cutaneous swellings and thickening of the footpads (pododermatitis) were also recorded. Bacteriological examination (isolation, identification and culture sensitivity testing) revealed *Staphylococcus aureus* was the most predominant microorganism isolated from the affected dogs (27 cases, 62.8%), *Staph. intermedius* (9 cases, 21%), *Gram positive catalase +ve* (one case, 2.2%) and *Gram-ve bacteria* (6 cases, 14%). A total number of 43 isolate (37 G+ve isolates and 6 Gram -ve isolates). Pyoderma due to *Gram positive* was sensitive to Amoxicillin+ clavulanic acid (43.2%) while the *Gram negative* was sensitive to Neomycin (50%).

INTRODUCTION

One of mostly encountered skin affection in canine medicine is pyoderma. Pyoderma is condition caused by various causes as Pyoderma infectious, inflammatory and /or neoplastic etiologies; any disorder that leads to buildup of neutrophilic exudates can be safely termed pyoderma **(Loeffler, 2005 and Morris, 2010)**. Pyoderma usually occurs as a secondary condition to hypersensitivity, ectoparasites and metabolic and immunological disorders are among most common disorders with subsequent development of pyoderma **(Frank *et al.,* 2003)**. *Staphylococcus* species is the most incriminated microorganism involved in pyoderma

(Craig, 2003), in recent years' other bacterial agents were implicated in pyoderma, among them *Proteus* spp., *Pseudomonas* spp. and *Escherichia coli* (**Manon Paradis *et al*., 2001**). In the two decades, treatment of canine pyoderma had been made problematic by the advent of antibiotic resistance in staphylococcal infection in the form of (*MRSP*) *mecithilin resistant staphylococcus pseudointermedius*, (**Coyner, 2014**). Pyoderma affecting canine population has many forms, superficial pyoderma characterized by pustules, papules, redness, focal crusting and pruritus and deep pyoderma with furuncles and draining tracts (**Hariharan *et al*. 2014**). Bacterial pyoderma is one of the most common causes of canine skin disease worldwide (**Manon Paradis *et al*. 2001).** Golden retriever and Collie were at increased risk to develop bacterial folliculitis and furunculosis. German shepherd accounted for one-third of the recurrent, idiopathic bacterial folliculitis and furunculosis (**Scott and Pardis 1990**). Mucocutaneous pyoderma commonly affects German shepherd dogs (**Zabel and Hensel, 2012**). Surface pyoderma characterized by acute moist pyotraumatic dermatitis (Hot Spot); fold pyoderma, mucocutaneous pyoderma. Superficial pyoderma (folliculitis) characterized by papules; pustules; focal areas of erythema with variable crust and alopecia; epidermal collarets (superficial spreading pyoderma) mucocutaneous pyoderma. Deep pyoderma characterized by focal areas of skin thickening, inflammation, crusting, serosanguinous or purulent exudates and draining tracts (**Leib and Monoroe, 1997).** Therefore, the present work was designed to study some epidemiological aspects of canine pyoderma, clinical and bacteriological parameters in dogs.

MATERIAL AND METHODS

A total number of 43 patient dogs of different age ranging from (2 months to 7 years), (22 cases from (1y-3y), 19 cases less than 1 year), both sexes (23 females, 53.5% and 20 males, 46.5%) with different breeds of dogs (14 German Shepherd (32.55%), 12 American Staffordshire (27.9%), 8 Rottweiler (18.6%), 3 Griffon (6.97%), 2 Golden retrievers (4.65%), 1 Dogo Argentina (2.32%), 1 Neapolitan Mastiff (2.32%), 1 Siberian Husky (2.32%) and 1 Dalmation (2.32%). An accurate clinical history of previous treatments, routine health care, such as internal parasite control and vaccination was collected. Most investigated dogs were vaccinated and were received one tablet/ 10 kg once of Drontal® plus (50 mg praziquantel, 150 mg Febantel, 144 mg pyrantel) as internal worm prophylaxis. Physical dermatological examinations were performed by inspection of different clinical signs.

Skin scraping:

Skin scrapings were performed for all examined dogs according to (**Leib and Monoroe, 1997**).

Direct Microscopic Examination: were performed according to **Lappin and Turnwald (2004)**.

Bacteriological Culture:

The lesion was squeezed to express exudates, which was collected on a swab tube and managed according to **Lappin and Turnwald (2004)**.

Antibiotic sensitivity test (Table 1):

Disc diffusion technique was applied. A zone of inhibition of bacterial growth is noted around disk containing known concentration of antibiotic. The procedure is qualitative and allocates organisms to the sensitive (susceptible), Intermediate (indeterminate), or resistant category, according to **NCCLS (2014)**.

Table (1): Interpretative standards of zone of Antibiotic discs.

Antibiotic discs	Disc concentration	Interpretative standards of zone diameter in mm		
		Susceptible (S) (≥ mm)	Intermediate (IM) (mm range)	Resistant (R) (≤ mm)
Penicillin G (P)	10 units	29	-	28
Erythromycin (E)	15µg	23	14-22	13
Clindamycin (DA)	2 µg	21	15-20	14
Cephalexin (CL)	30 µg	18	15-17	14
Chloramphenicol (C)	30 µg	18	13-17	12
Amoxycillin/ clavulinic (AMC)	30 µg (20+10)	20	-	19
Sulphamethoxazole/ Trimethoprim (SXT)	25 µg (23.75+1.25)	16	11-15	10

RESULTS AND DISCUSSION

Epidemiological data of canine pyoderma:

Occurrence and prevalence of canine pyoderma are shown in (Tables 2, 2a, 2b, 2c and 2d).

Table no. (2): Occurrence of Pyoderma types in different dog breeds.

Breed	Surface P	Superficial P	Deep P	% of total
German shepherd	10	0	4	32.55
American Staffordshire (American petibull)	4	4	4	27.9
Rottweiler	6	2	0	18.6
Griffon	0	3	0	6.97
Golden retriever	0	1	1	4.65
Dalmation	1	0	0	2.32
Mixed Dogo Argentino	1	0	0	2.32
Neapolitan Mastiff	0	0	1	2.32
Siberian Husky	1	0	0	2.32

Table no. (2-a): Relation between age, gender and affection with pyoderma.

	Number of cases	%
Age Less than 1 year	19	44.189
1-3 years	22	51.16
More than 3 years	2	4.65
Gender males	20	46.52
females	23	53.48

Table no. (2-b): Prevalence of Pyoderma types.

Type of pyoderma	No. of dogs	%
Surface	23	53.5
Superficial	10	23.25
Deep	10	23.25

Table no. (2-c): Prevalence of Pyodermal condition, primary and secondary.

condition	Surface P	Superficial P	Deep P	%
(primary)idiopathic	6	3	2	25.6
(secondary)FAD	3	4	1	18.6
(secondary) Demodicosis	14	3	7	55.8

Table no. (2-d): Prevalence of G+ve and G-ve Pyoderma.

Type of pyoderma	No. of dogs	%
G+ve Pyoderma	37	86
G-ve Pyoderma	6	14

Occurrence of canine pyoderma in the present studies were varies according to the patient breed, sex and age. As shown in (Table 2) the most affected breed was recorded in German shepherd dogs (32.55%) and the least affected breeds were Dogo Argentino, Neapolitan Mastiff, Siberian husky and Dalmation (2.32%). The moderately affected breeds were Griffon, Golden retriever and Rottweiler (4.65%-18.6%) nearly similar results were reported by **Rosser (2006)**, **Shyma and Vijayakumar (2012) and Lodh and Das (2013)**. Risk of pyoderma increased in the German shepherd breed may be attributed to the skin and hair condition. **Zabel and Hensel (2012)** found that cutaneous pH of German Shepherds was higher than those reported for other breeds predisposing them to cutaneous infections. a defective immune response at epithelial surfaces of German Shepherd breed is reported by **Chabanne *et al*. (1995), German *et al*. (2000), and McMahon *et al*. (2010)** possibly predisposing them to a number of syndromes including inflammatory bowel disease, aspergillosis, and pyoderma. **Aujla *et al*. (1996)** indicated that pure breed dogs were more susceptible to bacterial dermatitis than mixed breeds. Body size and pug-nosed breed were frequently affected by pyoderma in the skin folds of the face, lips and vulva. Concerning age and gender of the patients in (Table No. 2-a) showed that dogs at 1 to 3 years were the most affected (22 cases). Elder dogs were least affected (2cases). Younger dogs less than 1 year were nearly at high risk (19 cases). Our result agrees with **Shyma and Vijayakumar (2012)** noticed that, the higher occurrence of bacterial skin infection was in dogs of 1 to 3 years of age followed by 1 month to 6 months of age. Females were at high risk (53.5%) than males (46.5%) **Boost *et al*. (2008) and Shyma and Vijayakumar (2012)** reported that females were more susceptible than males, being frequently exposed to various stress factors including estrus, whelping, nursing and close confinement with pups. Contradictory opinions were reported by **Matousek and Camphell (2002)** who mentioned that the relative alkalinity of canine skin may be partly responsible for a higher predisposition to cutaneous infections. Concerning the type of pyoderma, as shown in (Table 2-b), surface pyoderma was the most prevalent skin infection as much as (53.5%) of the patient were affected. Both superficial and deep pyoderma were equally reported as much as (23-25%) of the patient were affected. In surface pyoderma, the skin infection only restricted to the surface and not extend into hair follicles. A lesion varies from erythema, papules, pustules, focal crusting and pruritus. In superficial pyoderma the infection extends into the hair follicles. In deep pyoderma the infection extends into the dermis with furuncles and draining tracts. Nearly similar results

were reported by **Hariharan** *et al.* **(2014)**. Predisposing etiologies of canine pyoderma in our studies are shown in (Table No. 2-c)**,** 55.8% of the cases secondary to demodicosis and 18.6% due to FAD (flea allergic dermatitis). Demodicosis is a common skin disease condition caused by tiny mites that inhabitant the hair follicle. It was reported by **(Sabnis, 2007)** that when these mites multiplied into numbers too large for the host animal or poor health weakened the immune system. Demodicosis canis is easily diagnosed by skin scraping. The majority of allergic dermatitis lesions were localized on dorsal lumbo-sacral area, ventral abdomen and flanks; our results came in accordance with **Bensignor (2014)**. As shown in (Table No. 2-c) 25.6% of the pyoderma was due to idiopathic etiologies. **Mason (1991)** reported that pyoderma can be initiated by hypersensitivity, ectoparasites, metabolic and immunological disorders, atopic dermatitis, contact allergy, food allergy and other skin disorders. The prevalent primary skin pathogen identified in our studies and as shown in table No. (2-d) were by G+ve and G-ve organisms. As much as 86 % G+ve organisms were identified from surface and superficial pyoderma and 14% G-ve organisms from the lesions of deep pyoderma. The obtained results came in accordance with **Gold** *et al.* **(2013) and Sykes** *et al.* **(2013)** and agree with **Manon Paradis** *et al.,* **(2001)** who reported that, the primary pathogen of canine pyoderma is *Staphylococcus intermedius*, a normal inhabitant of the skin and hair coat in dogs. In deep pyodermas, other bacterial pathogens, including gram-negative organisms such as *Proteus spp., Pseudomonas spp. and Escherichia coli*, may be involved.

The Clinical examination, dermatological lesions, types and distribution:

Main clinical signs (photos, 1 - 8) observed among the examined (43) dogs were pruritus, erythema, alopecia disperse with easy hair epilating, papulo-pustular eruptions, erosive or ulcerative lesions, scaling, crusting. Other clinical signs such as otitis, foul smelling odor, anal sacculitis, draining tracts and deep wounds, cutaneous swellings and thickening of the footpads (pododermatitis), come in agreement with **Verde (2005), Kennis (2006), Nuttall** *et al*. **(2009) and Jasmine (2011)** who reported the same clinical signs in dogs with different dermatological problems. *Staphylococcus intermedius* was found to produce exfoliative toxin which can cause exfoliation of skin that come in accordance with **(Terauchi** *et al.,* **2003).** The marked inflammation and itching can be correlated to super antigen production from abnormal bacterial colonization this explanation agreed with **(Ihrke, 1996)**.

1- 9- Months old Dalmation bitch showing erythema and patchy alopecia on back skin (surface G+ve) pyoderma).

2- 7- Months old German shepherd bitch showing erythema and patchy alopecia on thigh skin (surface G+ve pyoderma).

3- 7- Months old Golden Retriever bitch showing pustules in skin of abdomen (superficial G+ve pyoderma).

4- 7- years' old German shepherd dog showing excoriation and pus in skin of face (superficial G+ve pyoderma).

5- 4- Months old American Staffordshire Bull Terrier bitch showed crust and pustules on face and neck (superficial G+ve pyoderma).

6- 3- years' old German shepherd bitch showing excoriations, erythema and patchy alopecia on back (superficial G+ve pyoderma).

7- 2-years old German shepherd dog showing excoriations, erythema and patchy alopecia on back (superficial G+ve pyoderma).

8- 2- years' old German shepherd dog showing generalized crusty alopecia on face, neck, thorax and abdomen (deep G+ve pyoderma).

The bacteriological aspect of canine pyoderma:

Photo (9): showing Mannitol salt agar for cultivation of *Staphylococcus* species (red colonies…… *S.epidermises*, yellow colonies ……. *S. aureus*).

Photo (10): MacConkey agar medium plate showing growth of lactose fermenter *E. coli* (pink colony).

Bacteriological examination (isolation, identification and culture sensitivity testing) revealed *staphylococcus aureus* was the most predominant microorganism isolated from the affected dogs (27 cases, 62.8%), Staph. intermedius (9 cases, 21%), G+ve catalase+ve (one case, 2.2 %) and G-ve bacteria (6 cases, 14%), results are shown in photo 30, 31. Diagnosis of skin disease for confirmation the cause by direct microscopy, bacterial culture, antimicrobial sensitivity and hypoallergic dietary trial was performed to identify an adverse reaction to food and eliminate differentials **(Leib and Monoroe, 1997).**

Antibiotic sensitivity test:

A total number of 43 isolates (37 G+ve isolates and 6 G-ve isolates) were subjected for testing of their sensitivity to antibiotics using different antibiotic discs for choosing the most reliable and effective antibiotic (s) for treatment of canine pyoderma. The G+ve Pyoderma were sensitive to Amoxicillin+ clavulanic acid (43.2%), followed by Cephalexin (27%) this nearly similar to **Hariharan *et al*. (2014)** who found that all 43 isolates of staphylococci were susceptible to cephalexin and this corresponds with **Rosser (2000)** who declared that cephalexin is bactericidal, has a low potential for development of resistance and has minimal side effects. Also cephalexin is the most commonly prescribed drugs for *S. pseudintermedius* pyoderma in dogs **(Bryan *et al*. 2012)**. Chloramphenicol (16.2%). The G-ve Pyoderma was sensitive to Neomycin (50%), but they can resist Amoxicillin+ clavulanic acid, Rifampicin, Ciprofloxacin, Clindamycin and Enrofloxacin (83.3%).It is remarkable that higher percentage of the antimicrobials prescribed for companion animals in our clinics in Egypt was the broad-spectrum compounds and amoxicillin clavulanic acid which results in development of drug resistance, so antibiotics must be prescribed carefully at an adequate dose for a convenient duration.

CONCLUSION

It was concluded from the present study that:

1- Epidemiological studies denoted a high risk of pyoderma in German shepherd breed.

2- Concerning age and gender, it was noticed that, the high occurrence of bacterial skin infection in dogs of 1 t 3 years of age followed by 1 to 6 months of age.

3- Females were at high risk than males.

4- Concerning the type of pyoderma, surface pyoderma was the most prevalent infection than superficial and deep pyodermas.

5- Demodicosis is the most predisposing etiology of secondary pyoderma then FAD.

6- The most prevalent pathogens were G+ve organisms (especially Staph. aureus) than G-ve organisms.

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