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**BK Bhagya**Ph.D. Scholar, Department of  
Veterinary Medicine, Veterinary  
College, Bengaluru, Karnataka,  
India**C Ansar Kamran**Professor, Department of  
Veterinary Medicine, Veterinary  
College, Bengaluru, Karnataka,  
India**PT Ramesh**Professor and Head, Department  
of VCC, Veterinary College,  
Bengaluru, Karnataka, India**BM Veeregowda**Associate Professor, Dept. of  
Vet. Microbiology, Veterinary  
College, Bengaluru, Karnataka,  
India**Corresponding Author:****BK Bhagya**Ph.D Scholar, Department of  
Veterinary Medicine, Veterinary  
College, Bengaluru, Karnataka,  
India

## Dermatological diseases in pugs with special reference to canine atopic dermatitis

**BK Bhagya, C Ansar Kamran, PT Ramesh and BM Veeregowda**

**Abstract**

The present study was undertaken to know the occurrence of dermatological diseases in pugs with special emphasis on canine atopic dermatitis. Total of 911 pugs was presented to Veterinary College Hospital, Bengaluru for one year and nine months (January 2018- September 2019). Out of 911 cases presented, 419 cases were of dermatological origin with an incidence of 46 percent. Commonly encountered skin diseases were pyoderma, canine atopic dermatitis, tick infestation, flea allergy dermatitis, demodicosis, otitis, canine scabies, *Malassezia* dermatitis, food allergy, acral lick dermatitis, dermatophytosis and immune mediated disease. Incidence of atopic dermatitis was more in female dogs compared to males and incidence was more in pugs less than three years old. Skin lesions observed in atopic dogs were erythema, hyperpigmentation, papule, epidermal collarettes, lichenification, alopecia, excoriation, scales, salivary staining and pustules. Skin lesions were most commonly encountered on the Paws followed by the concave surface of the ears, ventral surface of the neck, groin, axilla, ventral abdomen, face, under the tail, medial surface of the thighs, flexor surface, muzzle and periocular area. In conclusion dermatological diseases are one of the major problems in pugs and CAD is one of the commonly seen skin disease in pugs presented to Veterinary College Hospital, Bengaluru.

**Keywords:** dermatological diseases, CAD, pug

**Introduction**

Pug is a breed of Chinese origin and is thought to be one of the oldest dog breeds, with references to 'short-mouthed' pug-type dogs documented by Confucius as early as 551 BC. Pug name is thought to be derived from the Latin word pugnus meaning fist, as the side profile of the pug's head resembled the shape of a closed fist<sup>[2]</sup>. The breed became iconic in India, as it was featured as the mascot in a series of Vodafone (Hutch) advertisements. Most commonly diagnosed skin diseases in pugs are canine atopic dermatitis, demodicosis, facial fold intertrigo, hypothyroidism, mast cell tumour, pigmented viral plaques and tail fold intertrigo<sup>[7]</sup>. Pug is one of the most commonly maintained pedigree dog breeds in Bengaluru. Even though pugs are predisposed for atopic dermatitis not much work has been carried out about CAD in pugs. So present study was taken to throw light on canine atopic dermatitis in pugs.

**Materials and Methods**

Hospital records of Veterinary College Hospital, Bengaluru for one year nine months (January 2018 to September 2019) were used for an epidemiological study on dermatological diseases in pugs. Pruritic skin diseases, which mimics canine atopic dermatitis were ruled out one by one.

*Sarcoptic* mange was excluded by lack of response to three doses of Inj.Ivermectin 200 µg/ kg body weight given once a week. Food allergy was excluded by giving an elimination diet for about 8- 12 weeks. Any mite infection was ruled out by skin scraping examination and by treating with ectoparasiticide drugs. Flea allergic dermatitis was ruled out by treating with flea control spot on containing fipronil 9.8 per cent w/v and (s)-methoprene 8.8% w/v (Fiprofort plus® manufactured from Savavet). A total of fifty Pugs was tentatively diagnosed as atopic mainly based on history, clinical signs and after fulfilment of criteria for the diagnosis of canine atopic dermatitis<sup>[3]</sup> and subjected to an intradermal test for the confirmatory diagnosis of CAD.

**Results and Discussion**

In the present study a total of 911 pugs were presented to Veterinary College Hospital,

Bengaluru for one year and nine months (January 2018-September 2019). Out of which 419 cases were of dermatological origin (46%). The results of the present study indicate dermatological problems as one of the major problems in Pugs. In Veterinary Medicine, very little information is available concerning the demographics of canine skin disorders. The results of the present study are in accordance with the reports of Nesbitt <sup>[9]</sup> and Wilkinson <sup>[19]</sup> and they have reported that 20 per cent to 75 per cent of the cases seen in the average small animal practice have skin problems as a chief or concurrent owner complaint.

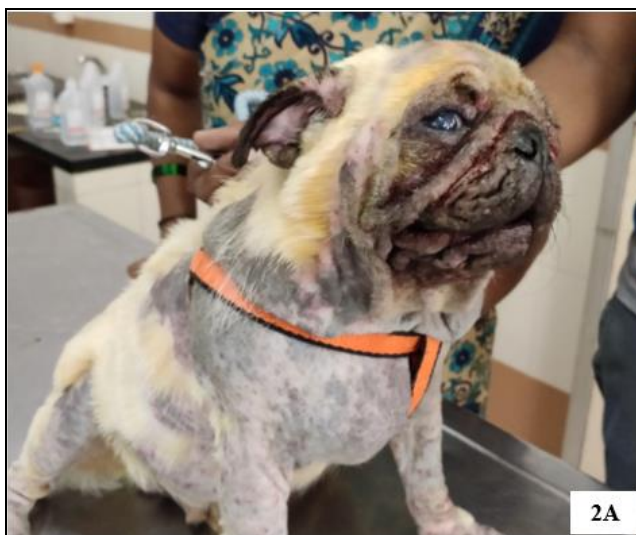
Different skin diseases encountered among 419 cases were pyoderma (34.3%), canine atopic dermatitis (30.5%), tick infestation (13%), flea allergy dermatitis (9.5%), demodicosis (5%), otitis (3.3%), canine scabies (2.1%), *Malassezia* dermatitis (1%), food allergy (0.7%), acral lick dermatitis (0.2%), dermatophytosis (0.2%) and immune mediated disease (0.2%) (Plate 1-8). Results of the present study find their agreement with that of O'Neill *et al.* <sup>[12]</sup> who reported that dermatological problems were commonly seen in Pugs and the most commonly diagnosed conditions were otitis externa, anal sac impaction, intertrigo, pruritus, alopecia and pyoderma.

Canine atopic dermatitis was recorded in 30.5 percent of the pugs presented to Veterinary College Hospital, Bengaluru for

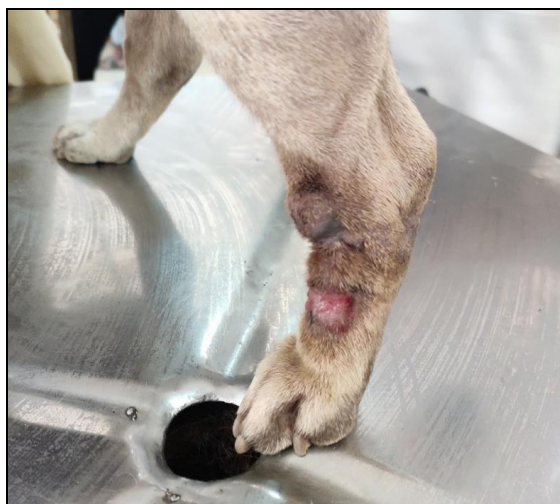
dermatological issues. The results of the present study correlate with the findings of Nesbitt <sup>[8]</sup>, who reported that 30 per cent of cases presented at a private dermatology referral practice were diagnosed as atopic dermatitis.



**Plate 1:** A case of superficial folliculitis showing epidermal collarettes



**Plate 2 & 2A:** Chronic case of generalised demodicosis showing alopecia, hyperpigmentation and ulcerations



**Plate 3:** A case of acral lick dermatitis showing alopecia, salivary staining and ulceration on left hind limb



**Plate 4:** A case of flea bite hypersensitivity showing hyperpigmentation, alopecia and lichenification in the lumbo sacral region

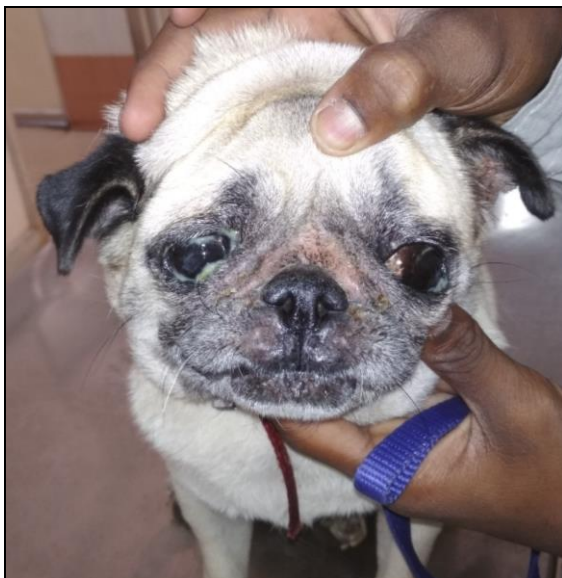




**Plate 5:** A case of immune mediated disease in pug showing hyperkeratosis of footpads



**Plate 6:** A case of tail fold intertrigo showing alopecia, hyperpigmentation and moist lesions



**Plate 7:** A case of facial fold intertrigo showing alopecia and moist lesions



**Plate 8:** A case of moist eczema showing erythema, alopecia and moist lesions

The true prevalence of atopic dermatitis is difficult to determine, as mild cases are often successfully managed with symptomatic therapy without a specific diagnosis being made. Some clinical manifestations of atopic dermatitis are not recognised by owners or veterinarians as being part of atopic dermatitis, such as chronic otitis, bacterial or *Malassezia* infections [6]. It can therefore be inferred that the incidence of CAD among pugs could be much higher than what has been diagnosed in the present study. The factors that may contribute to an increase in the incidence of canine atopic dermatitis in pet dogs are, more time spent indoors, thereby increasing exposure to common indoor allergens such as the house dust mites, increased popularity of pure dog breeds, wherein selection of lines of dog with atopic mutations, would likely contribute to an increased incidence of atopic dermatitis in dogs [6].

Occurrence of CAD was higher in females (62.5%) than males (37.5%). Results of the present study correlate with the findings of Halliwell and Schwartzman [5], Scott [14] and Nesbitt *et al.* [10], who have reported that female dogs are predisposed for CAD. These differences could be explained by the presence of mutated genes on X chromosomes but could also be due to the over-representation of one sex of this breed. In the present study occurrence of CAD was higher in pugs less than 3 years old (46%), followed by 3 to 5 years (26%), 5-7 years (15%) and more than 7 years (13%). Similar findings were reported by Umesh [17], Scott *et al.* [15], Saridomichelakis *et al.* [13], Vaseem [18], Favort *et al.* [4] and Zur *et al.* [20]. The typical age of onset of canine AD is reported to be between 6 months and 3 years. Many factors can determine the age of onset, including breed and geographical area. Highly susceptible dogs in warm climate with pollen present all year round are at increased risk for early onset of clinical signs [6].

Total of fifty cases were selected as a subject for the study and clinical signs, skin lesions and their distribution were recorded. Skin lesions recorded in atopic dogs were erythema (86%), hyperpigmentation (68%), papule (58%), epidermal collarettes (50%), lichenification (42%), alopecia (36%), excoriation (12%), scales (12%), salivary staining (10%) and pustules (2%). Secondary skin lesions are commonly reported in canine atopic dermatitis, and these reflect chronic pruritus, trauma, chronic inflammation, and concurrent secondary infections or microbial over growth. These lesions are observed principally at sites of pruritus. Similar skin lesions were observed by Saridomichelakis *et al.* [13], Chanthick *et al.* [3] and Vaseem [18].

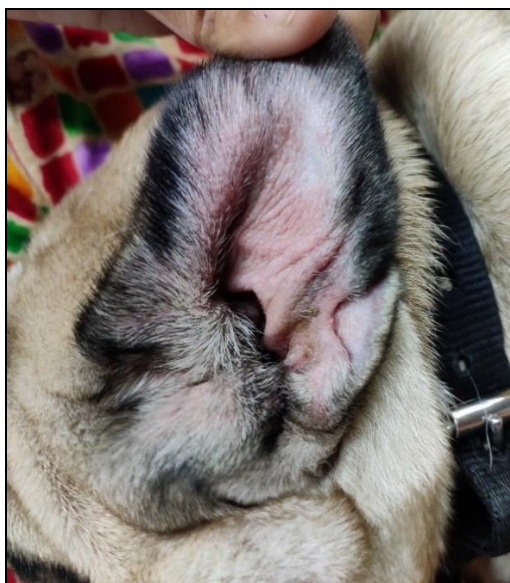


Hyperpigmentation may occur in any area where there has been inflammation or irritation to the skin. In post inflammatory hyperpigmentation, skin (melanoderma) or hair (melanotrichia) become hyperpigmented as a sequela to an underlying skin disease such as pyoderma, demodicosis, dermatophytosis, or hypersensitivity. Post inflammatory hyperpigmentation reflects increases in cytokine amounts and activity following infection or inflammation. Several cytokines, such as arachidonic acid, prostaglandin (PG) E<sub>2</sub>, and PGD<sub>2</sub>, increase melanocyte proliferation. Melanocyte dendricity is enhanced by PGE<sub>2</sub>, leukotriene (LT) C<sub>4</sub>, LTD<sub>4</sub>, and thromboxane 3 (TX<sub>3</sub>). Arachidonic acid, TX<sub>3</sub>, LTD<sub>4</sub>, and LTC<sub>4</sub> enhance the activity of tyrosinase. Melanocyte production is stimulated by LTD<sub>4</sub> [16].

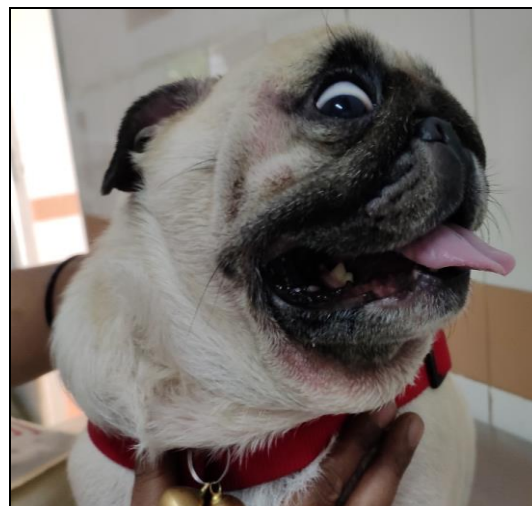
Lichenification is a thickening and exaggeration of skin markings. This may develop in any location where there is chronic inflammation or irritation to the skin. Constant licking by the animal may contribute significantly to its development [11]. In atopic dermatitis, increased scaling may occur due to an increased turnover time either of the epidermis or due to a dyskeratosis [11]. In AD inflammation of the skin can occasionally result in a synchronization of hair to the telogen phase, resulting in either a diffuse thinning of the coat or complete hair loss. More commonly, focal areas of alopecia may occur at the sites of secondary staphylococcal infection or from scratching, biting, or licking at the skin [11]. Allergic dogs are especially prone to infections because of the damage they do to their skin while itching and the corticosteroids they often receive [7].

In the present study fifty per cent of atopic dogs showed secondary bacterial infection and four per cent of atopic dogs showed secondary *Malassezia* dermatitis.

Skin lesions were most commonly encountered on the Paws (86%) (palmar surface, plantar surface and interdigital space) followed by concave surface of the ears (74%), ventral surface of the neck (46%), groin (44%), axilla (34%), ventral abdomen (28%), face (16%), under the tail (14%), medial surface of the thighs (6%), flexor surface (4%), muzzle (4%) and periocular area (2%) (Plate 9-20). Distribution of lesions observed are in agreement with the findings of Chanthick *et al.* [3]. (2008) and Vaseem [18].



**Plate 9:** Acute case of CAD showing erythema on the medial surface of the ear



**Plate 10:** An acute case of CAD showing erythema on the face



**Plate 11:** Chronic case of CAD showing hyperpigmentation, alopecia and lichenification



**Plate 12:** A case of atopic dermatitis showing erythema, alopecia, hyperpigmentation and lichenification in axillary region, ventral surface of the neck and on fore limbs

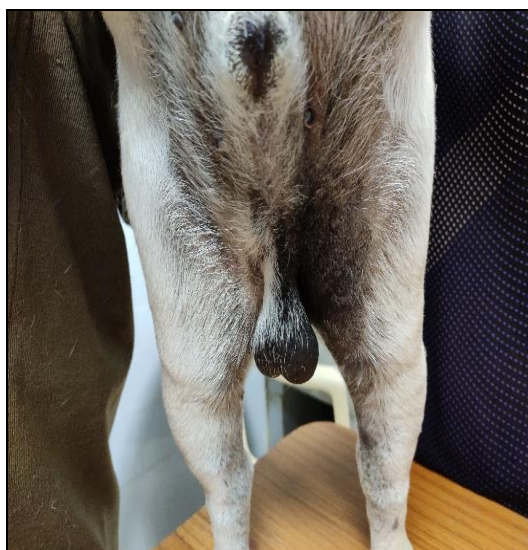




**Plate 13:** A chronic case of atopic dermatitis showing hyperpigmentation in the axillary region and groin region



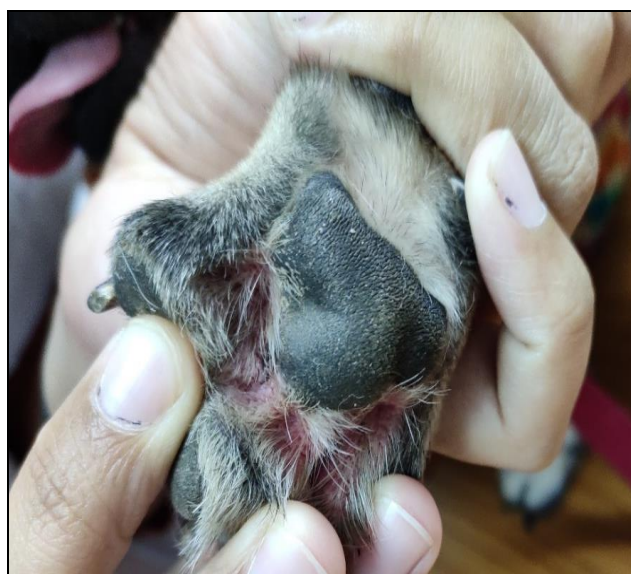
**Plate 14:** A chronic case of atopic dermatitis showing epidermal collarettes because of secondary bacterial infection and hyperpigmentation on the ventral aspect of the body.



**Plate 15:** Chronic case of CAD showing hyperpigmentation on the medial surface of the thighs



**Plate 16:** Chronic case of CAD showing hyperpigmentation on the ventral surface of the body



**Plate 17:** A case of CAD showing presence of erythema in the paws



**Plate 18:** Atopic pug showing salivary staining ie rusty brown discoloration of hair on the dorsal aspect of paws because of licking





**Plate 19:** A chronic case of atopic dermatitis showing hyperpigmentation and lichenification on the dorsal aspect of paws.



**Plate 20:** A chronic case of atopic dermatitis showing hyperpigmentation due to secondary *Malassezia* infection

Mast cells concentrate in the pinnae, ventral and inter digital skin, which are all predilection sites for atopic dermatitis [1]. Auxilia and Hill [1] reported the highest density of canine cutaneous mast cells in the pinnae and ventral interdigital skin as compared to the nasal planum and they hypothesised that this may be one of the factors in the frequent occurrence of ear and foot pruritus in canine atopic dermatitis. In dogs with AD, epicutaneous route of allergen exposure is responsible for distribution of lesions in CAD [7].

### Conclusion

In conclusion dermatological problems are one of the major

problems in pugs and atopic dermatitis is one of the commonly seen skin diseases in pugs presented to veterinary college hospital, Bengaluru and further studies may be required to know more about CAD in pugs.

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