

# Secondary or Concurrent Infections in Skin of Atopic Dogs

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## ABSTRACT

*In the present study, atopic dogs were screened for different secondary infections using standard diagnostic techniques viz. direct examination, flea comb method, trichogram, skin scrapings, impression smear, bacterial and fungal culture and isolation. The major concurrent pathogens isolated from dogs were bacterial organisms; especially staphylococcal infection (90%). Different commensals on skin like Staphylococcus spp., Aspergillus spp. (50%), Malassezia spp. (45%), Demodex spp. (25%) etc. caused secondary or concurrent infections in atopic dogs. This indicates the importance of atopic dermatitis in recurrent or non-responding dermatitis with concurrent flare up of those commensal organisms.*

**Key words:** Atopy, Commensal, Dog

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## INTRODUCTION

Canine dermatitis cases are recurrent in nature and commensal organisms play a major role in that. Commensal on skin can flare up due to many underlying diseases leading to dermatitis. Atopy is one among the underlying disease predisposing to dermatitis. It is a multifaceted disease associated with exposure to various offending agents such as environmental and food allergens (Favrot *et al.*, 2010). Atopy reduces the diversity of microbiome of the skin causing some of the bacteria to multiply and exaggerate the lesions. Like bacteria yeast also multiplies in atopic lesions causing increasing the severity of lesions. Flea allergy is also a concurrent observation noticed in atopic animals. Limited information is available about secondary invaders of atopic dermatitis affected dogs in Indian scenario. Hence, the present investigation was carried out to find out the different secondary or concurrent infections in affected skin of atopic dogs.

## MATERIALS AND METHODS

This study was held at Teaching Veterinary Clinical Complex, College of Veterinary Science and Animal Husbandry, Junagadh Agricultural University, Junagadh from May 2018 to April 2019. Animals with skin conditions not responding to rational treatment fulfilling any 5 Favrot's criteria (Favrot *et al.*, 2010) were diagnosed as atopic dogs. Different criteria screened were age at onset < 3 years, mostly indoor, corticosteroid responsive pruritus, chronic or recurrent yeast infections, affected front feet, affected ear pinnae, non

non affected ear margins and non affected dorsolumbar area. All 20 atopic dogs identified were screened for different secondary or concurrent infections using different dermatological techniques. They were checked for external parasites or flea dirt by direct examination or brushing the hair coat (flea combing). Deep skin scrapings of lesion were taken after clipping the hairs of affected area and application of a drop of mineral oil on the lesions. Multiple scrapings were performed in the direction of the hair growth until capillary bleeding occurs. Skin was squeezed during or between scrapings to extrude the mites from the deep follicles to the surface. Debris was then transferred to a slide, mixed with mineral oil and was examined with a coverslip under the microscope at low - power magnification.

In those areas were difficult to scrape, trichograms were preferred. For that, hairs from affected skin were plucked with forceps in the direction of the hair growth and were placed in a drop of mineral oil on a slide. It was then examined under low - power magnification after application of cover slip. Impression smear from affected lesions were checked for *Malassezia* spp. after staining with giemsa stain and examined under oil immersion.

Sterile swabs from lesions were inoculated on brain heart infusion agar (BHI) for bacterial culture and media was incubated at 37°C for 48 hours. Also skin scrapings from the lesions were collected under sterile precautions and were inoculated on dermatophyte test medium (DTM) added with dermatology supplement or sabouraud dextrose agar and

was incubated at room temperature for 5 days. Morphological and microscopical examination of both microbial colonies were performed for identification of microbes.

## RESULTS AND DISCUSSION

Different infectious agents isolated from skin of atopic dogs are enlisted in Table 1. Majority of atopic animals were suffering from multiple infections instead of single infection.

*Staphylococcus* spp. were the most common finding as secondary infection (Fig. 1). This bacterium is a normal commensal on the skin and usually flare up during favourable conditions. *Micrococcus* spp. also could be isolated along with *Staphylococcus* spp. in one dog. These results indicate the chance of occurrence of atopy as an underlying factor for recurrent pyoderma. Maruti (2015), Sharma *et al.* (2015) and Chermprapai *et al.* (2019) also noticed higher infection of *Staphylococcus* spp. in atopic dogs. Mammalian skin consists of antimicrobial peptides such as  $\beta$ -defensins and cathelicidins produced by keratinocytes in the skin which disrupt the membrane of the target microbe or penetrate the

microbial membrane, interfering with intracellular functions. These peptides are found lesser in atopic animals making the animal susceptible to infection of microbes (Ong *et al.*, 2002). It could be the reason for recurrent pyoderma in atopic dogs.

Major fungus observed in the skin lesions collected from atopic dogs was *Aspergillus* spp. (Fig. 2) which was isolated from ten dogs. *Malassezia pachydermatis* (Fig. 3) was observed in the skin lesions of nine atopic dogs, *Absidia* spp. in four dogs, macroconidia of *Alternaria* spp. (Fig. 4) in two dogs, *Rhizopus* spp. in one dog. Dermatophytes were concurrent infections with atopic dermatitis in four dogs. Many scientists reported that animals / people shows allergy to these commensal or airborne fungi like *Aspergillus* spp., *Malassezia* spp. and *Alternaria* spp. which can result in dermatitis. Also skin is the barrier which protect from such commensal fungi; since epidermal barrier was not well-functioning in atopic animals which further resulted in sensitization of allergens of these commensal fungi causing atopic dermatitis (Celakovska *et al.*, 2018). Many researchers (Nuttall and Halliwell, 2001; Maruti,



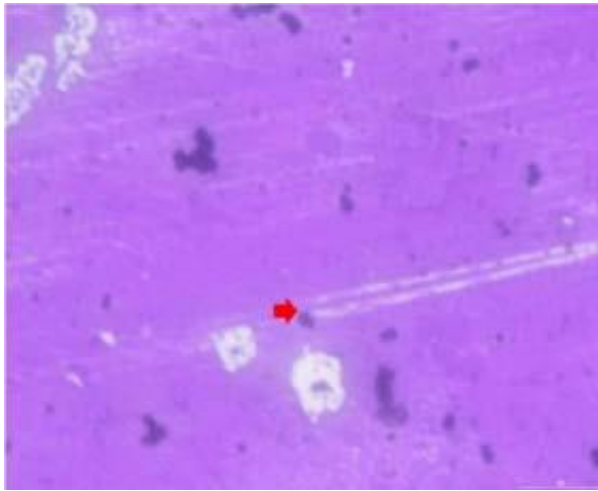
**Fig. 1:** Staphylococcal organisms in impression smear, culture & microscopy

**Table 1.** Secondary infection / Concurrent infection observed in atopic dogs

S.No.	Infectious agent	Number of animals infected (Out of 20 atopic animals)	Percentage
1.	<i>Staphylococcus</i> spp.	18	90
2.	<i>Micrococcus</i> spp.	1	5
3.	<i>Aspergillus</i> spp.	10	50
4.	<i>Malassezia pachydermatis</i>	9	45
5.	<i>Absidia</i> spp.	4	20
6.	Dermatophyte	4	20
7.	<i>Alternaria</i> spp.	2	10
8.	<i>Rhizopus</i> spp.	1	5
9.	<i>Demodex canis</i>	5	25
10.	Flea	1	5



**Fig. 2:** Aspergillus organisms in impression smear, culture & microscopy



**Fig. 3:** *Malassezia* spp. (1000 x)



**Fig. 5:** *Demodex canis* organisms (100 x)



**Fig. 4:** Macroconidia of *Alternaria* spp.

2015) have reported malasseziosis in atopic dermatitis in accordance with results of present study. *Demodex canis* ova / organisms (Fig. 5) were noticed in 5 atopic dogs (they didn't respond to ectoparasitocidal treatment). This organism is a commensal on skin of dog. *Demodex canis* might have flared up due to earlier improper treatment for

atopic dermatitis. Also in case of recurrent or non responding demodicosis, atopy has to be ruled out. Later this case responded to treatment for atopy. Agreeing with results of the study, demodicosis was also noticed in atopic dog by Lockwood *et al.* (2017).

These results indicate that, recurrent or non responding dermatitis especially due to commensal organisms can also occur in concurrence with primary diseases like atopic dermatitis. So, in such conditions, atopy has to be ruled out and further treatment measures should be considered.

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#### REFERENCES

Celakovska, J., Josef, B., Ettler, K., Vaneckova, J., Ettlerova, K. and Jan, K. (2018). Sensitization to fungi in atopic dermatitis patients 14 year and older - Association with other atopic diseases and parameters. *Indian J. Dermatol.* 63(5): 391-398.

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- Chermprapai, S., Ederveen, T.H.A., Broere, F., Broens, E.M., Schlotter, Y.M., Schalkwijk, S., Boekhorst, J., Hijum, S, A.F.T. and Rutten, V.P.M.G. (2019). The bacterial and fungal microbiome of the skin of healthy dogs and dogs with atopic dermatitis and the impact of topical antimicrobial therapy, an exploratory study. *Vet. Microbiol.* 229(1): 90-99.
- Favrot, C., Steffan, J., Seewald, W. and Picco, F.A. (2010). Prospective study on the clinical features of chronic canine atopic dermatitis and its diagnosis. *Vet. Dermatol.* 21(1): 23-31.
- Lockwood, S.L., Mount, R., Lewis, T.P. and Schick, A.E. (2017). Concurrent development of generalised demodicosis, dermatophytosis and meticillin-resistant *Staphylococcus pseudintermedius* secondary to inappropriate treatment of atopic dermatitis in an adult dog. *Vet. Rec.* 5(1): 1-9.
- Maruti, M.S. (2015). Canine Atopic Dermatitis and Its Therapeutic Management. A Ph. D. Thesis submitted to Maharashtra Animal and Fishery Sciences University, Nagpur, Maharashtra, India.
- Nuttall, T.J. and Halliwell, R.E. (2001). Serum antibodies to *Malassezia* yeasts in canine atopic dermatitis. *Vet. Dermatol.* 12(6): 327-332.
- Ong, P.Y., Ohtake, T., Brandt, C., Strickland, I., Boguniewicz, M., Ganz, T., Gallo, R.L. and Leung, D.Y.M. (2002). Endogenous antimicrobial peptides and skin infections in atopic dermatitis. *N. Engl. J. Med.* 347(15): 1151-1160.
- Sharma, R., Hussain, K., Chhibber, S., Kumar, M. and Sharma, N. (2015). Allergic dermatitis occurrence pattern in canine of Jammu region, *Indian J. Anim. Res.* 5(3): 533-537.