# СЕКЦІЯ X.
# ВЕТЕРИНАРНІ НАУКИ

## JUVENILE DEMODICOSIS IN FRENCH BULLDOGS

**A.A. Smulska**
student of faculty of veterinary medicine
*National University of Life and Environmental Science of Ukraine, Kyiv, Ukraine*

The French Bulldog, despite its name, is a breed of both British and French origin. The breed was first recognised by The Kennel Club in 1906 and has three colourings currently allowed: brindle, fawn and pied. French Bulldogs are currently very popular in the UK and were the second most commonly registered UK pedigree dog breed in 2017. Owners of this breed are attracted to their distinctive appearance, their size being suited to a sedentary lifestyle, and the perception that they are a good companion and children's breed. However, despite their popularity, the breed has some well-documented health issues, especially in relation to eye, breathing, skin and spinal problems. Collection of health information on large numbers of French Bulldogs attending veterinary practices in the UK would provide reliable data to assist with reforms that aim to improve the health of the breed. The VetCompass™ Programme collects de-identified clinical record data from veterinary practices in the UK for research to improve animal welfare[1].

Demodicosis is a common disease in canine practice caused by a proliferation of Demodex mites. These mites are normal commensal organisms in the hair follicles of many mammals. In the dog they are transmitted during the first days of life from the dam to the puppies. In most species, demodicosis occurs only when animals are immunocompromised due to other diseases or undergoing immunosuppressive therapies. Demodicosis in immunosuppressed individuals has been reported in humans, dogs and cats amongst others. With the exception of Demodex gatoi in the cat, the dog is the only species where young and otherwise healthy animals develop demodicosis. This juvenile demodicosis has been presumed to be due to cell-mediated deficiency[2].

Canine demodicosis is commonly classified by either the age at onset (juvenile versus adult) and/or the extent of the disease (localised versus generalised) to assist with prognostic advice and to guide diagnostic and management approaches. Given that very low numbers of D. canis inhabit haired skin of dogs without skin disease, the question arises as to why some of these dogs develop skin lesions from which large numbers of mites can be recovered. In some affected dogs, lesions with abnormally high numbers of mites are few and transient (mild localised disease), while others show large areas and/or multiple sites affected by lesions that do not resolve without treatment (generalised disease). Although genetic or acquired immunosuppression affecting control of mite populations is generally assumed to be central to the pathogenesis, the genetics, immunology and pathogenesis of demodicosis remain poorly understood and are likely to be highly complex[3].

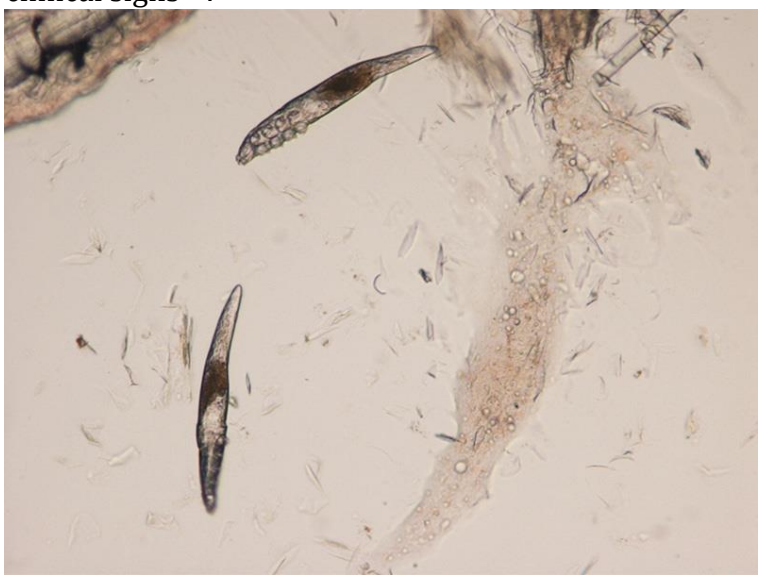
**Genetics of juvenile demodicosis**

For decades, strong breed predilections were reported for canine juvenile demodicosis. In early reports, those lists were largely anecdotal. One large, well-powered study identified a greater than four-fold increased risk of developing generalized demodicosis for the American Staffordshire terrier, Staffordshire bull terrier, Chinese shar-

pei and French bulldog.A further study in the United States identified the English bulldog, pit bull and Sealyham terrier as predisposed breeds for juvenile onset demodicosis.

Those breed predilections and the frequent occurrence of juvenile demodicosis in certain lines, sibling puppies and related dogs make a hereditary basis very likely. In addition, there is anecdotal evidence that preventing affected dogs from breeding decreases the frequency of the disease. However, to the best of the authors' knowledge, only one study has been published evaluating the genetic basis in more detail.

Demodicosis in juvenile dogs shows a wide variety of clinical signs, from mild, localized alopecia to severe generalized forms with prominent systemic signs. These variations may be seen within the same litter of puppies. In addition, dogs respond differently to the various therapeutic approaches. Thus, it is likely that several genes are involved in the pathogenesis and, thus, more and larger studies are needed to elucidate the genetic background of the disease. Further support for a multi-gene involvement is the immunodeficient double knock-out mouse strain lacking CD28 and STAT6. By contrast to the double knock-out mice, single knock-out siblings kept in close contact and lacking either CD28 or STAT6 did not show any clinical signs[2].



***Demodex canis identified on skin scrapings***[4]

Reported prevalence values for canine demodicosis vary widely, from 0,4 to 23%. This wide prevalence range may result from studies using skewed populations from diverse geographical locations and that may not distinguish between the different forms of the disease. Multiple, and often conflicting, risk factors and breed predispositions have been proposed and re-cited widely, although the strength of evidence for many of these original studies is often questionable. Some larger and more recent studies from the USA reported prevalence values of 0,58% based on a diagnosis of juvenile demodicosis alone from the electronic records of a large network of veterinary practices and 0,37% for demodicosis overall based on data from one teaching hospital. Reports on breed as a risk factor or of breed representation differed markedly within these study groups, with bull dog and bull terrier types and shar-pei dogs having high odds of diagnosis with juvenile demodicosis, but crossbred dogs were the most frequently represented dogs in the study of overall demodicosis. The need for accurate and generalisable prevalence risk factor data on diseases with an inherited component has been highlighted as a key criterion for longer term reduction in disease and improvement in dog welfare.

The present study aimed to explore epidemiological features of canine demodicosis as relevant to veterinary practitioners in the UK, based on the general population of dogs under primary veterinary care practices enrolled in the UK VetCompass Programme. The specific objectives were: to report the 1-year period prevalence and age distribution of demodicosis in dogs of all ages attending primary care practices in the UK; and, to report the 1-year period prevalence and evaluate risk factors for demodicosis separately for dogs under 2 years of age (juvenile-onset) and for those aged over 4 years (presumed adult-onset). The

study proposed that breed risk factors are distinct between the juvenile and adult-onset forms of the disease.

The VetCompass Programme collates de-identified electronic patient record (EPR) data from primary-care veterinary practices in the UK for epidemiological research. VetCompass collects information fields that include species, breed, date of birth, sex, neuter status and bodyweight and clinical information from free-form text clinical notes plus treatment with relevant dates.

Binary logistic regression modelling was used to evaluate unconditional associations between hypothesised risk factors (breed, purebred, adult bodyweight, bodyweight relative to breed/sex mean, age category, sex, neuter) and demodicosis during 2013. Based on review of the current literature on reported risk factors and pathogenesis of demodicosis within possible causal pathways, the following factors were allowable for inclusion in multivariable evaluation to build a breed-multivariable model: breed, bodyweight relative to breed/sex mean, age, sex-neuter. Because breed was a factor of primary interest for the study, purebred (derived from the breed variable) and adult bodyweight (a defining characteristic of individual breeds) were not considered in the same multivariable modelling. Instead, purebred replaced the breed variable in the final breed-multivariable while adult bodyweight replaced the breed and bodyweight relative to breed/sex mean variables. Model development used manual backwards stepwise elimination.

**Results**

From dogs of all ages, there were 788 demodicosis cases confirmed from 455,553 dogs under veterinary care during 2013 at 304 clinics to give a 1-year period prevalence for demodicosis overall of 0,17% (95% CI: 0,16 to 0,19). The breeds with the highest demodicosis 1-year period prevalence across all ages were British bulldog, French bulldog, pug, dogue de Bordeaux and Chinese shar-pei. The age at first diagnosis was available for 702/788 (89,1%) cases. Of these 702 cases, the median age at first diagnosis overall was 7 months [interquartile range (IQR) 4 months to 13 months, range 1 month to 16 years and 2 months] and 508 (72.4%) were <1 year, 559 (79,6%) were <1,5 year, 573 (81,6%) were <2 years and 98 (14,0%) were >4 years[3].

**Conclusion**. The generalized form of juvenile demodicosis in dogs is not spontaneously cured, but requires acaricidal therapy.

## References:

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