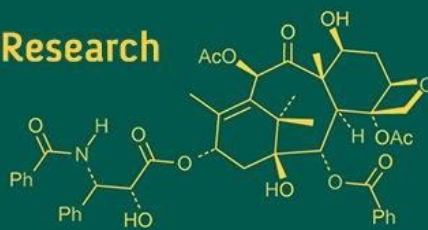


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Demographic study of staphylococcal pododermatitis in Jabalpur

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Abstract

A study was undertaken to determine the prevalence of Staphylococcal pododermatitis amongst different dermatological conditions. During the study period, a total of 2475 dogs presented to VCC, College of Veterinary Science and Animal Husbandry, Jabalpur (M.P.) were screened over six months period from May to October 2024. Out of which, 248 dogs showed clinical signs pertaining to pododermatitis, the overall occurrence of pododermatitis was 3.27% although the occurrence of Staphylococcal pododermatitis was 1.29%. Higher occurrence was observed in male dogs (43.18%) in comparison to females. Dogs in the age group of 1-3 years were mostly susceptible (50%) to Staphylococcal pododermatitis and the least susceptible were below 1 year of age. Results revealed that Labrador (44.44%) were more predisposed followed by non-descript (41.67%) and the least predisposed breed was found to be Pug (30.77%). The most common clinical signs of pododermatitis observed were licking (53.13%), erythema (43.75%) with limping and bleeding the least presented clinic signs (6.25% each). The clinical signs were more prominent in all four paws.

Keywords: Pododermatitis, prevalence, occurrence, dogs, staphylococcal

Introduction

Canine pododermatitis is an inflammatory condition of the skin of paw including interdigital spaces, footpads, nail folds and claws. It is a fairly common disease which has been misdiagnosed due to the overlapping similar conditions (Bajwa, 2023) [2]. It is a clinical presentation with various lesions that maybe present on all the paws or only one. The lesions formed are mainly due to physical injuries, ectoparasitic infestations, faulty managerial practices and the thin layer of stratum corneum (Nayak *et al.*, 2016) [19]. Although it has been vastly studied in man, a lot has yet to be studied and evaluated in veterinary field. Even with the invention of new diagnostic techniques, this clinical disorder might present difficulties and frustrations for a practicing veterinarian (Manning, 1983) [17]. Coagulase-positive *Staphylococcus*, such as *Staphylococcus aureus* and *S. pseudintermedius*, are frequently found on healthy skin and should be regarded as normal inhabitants (Miller *et al.*, 2013) [18]. *Staphylococcus* infection is often caused due to disruption in the normal skin barrier, which can be due to various underlying issues such as allergies, hormonal imbalances, trauma, conformational abnormalities, etc. Bacterial pododermatitis is frequently observed as a secondary element in numerous cases of pododermatitis, yet it can also manifest as the primary factor in certain instances. *Staphylococcus pseudintermedius* is one of the most common causes. Superficial infections mostly affect the interdigital area of paw. Interdigital erythema, pustules, papules, nodules, hemorrhagic bullae, fistulae, ulcers, alopecia, or swelling may appear in one or more paws. Symptoms such as pruritis (licking, chewing), pain, or limping may be seen. Regional lymph node enlargement is also observed frequently (Hnilica and Patterson, 2017) [8]. This can be diagnosed by using tests such as culture and sensitivity test as well as molecular test like PCR. Lesions on the digits facilitate the invasion of microorganisms, resulting in suppuration, which can worsen into a more severe purulent lesion, largely due to persistent licking and inadequate pedal hygiene (Nayak *et al.*, 2016) [19]. Due to the anatomical location of the paws and ever so permanent physical contact with environmental factors leading to secondary infection, treating pododermatitis becomes one of the most challenging and complicated conditions in veterinary dermatology.

In addition, the persistent environmental contact makes the infection resistant to the conventional therapies. Inability to restrict the movement of the animal can lead to the progression of the condition, making it chronic and painful. Therefore, most cases require extensive therapy to address pododermatitis adequately. The present study was conducted with the objective of determining a detailed occurrence of Staphylococcal pododermatitis in Jabalpur.

Materials and Methods

All dogs presented to VCC, College of Veterinary Science and Animal Husbandry, Jabalpur (M.P.) from May 2024 to October 2024 were screened. The detailed history of animals regarding sex, age, breed, location of lesions and initial symptoms, various parameters like rectal temperature and body condition were recorded. The paws were thoroughly examined for presence of erythema, swelling, bleeding, alopecia, ulceration, erosions, nodules, pustules and footpads were examined for presence of fistulas, etc. Also, the number of paws affected were taken into consideration. The prevalence was statistically analysed amongst the total number of suspected cases of pododermatitis screened using chi-square test.

Results and Discussion

During the study period, 2475 dogs were screened, out of which 248 dogs were examined that were exhibiting clinical signs related to pododermatitis like licking, erythema, alopecia, hyperpigmentation, crustation, pustules/papules, bleeding, ulceration, interdigital nodules, lameness/limping and swelling of paws. The overall occurrence of pododermatitis was 3.27% (81/2475) and that from the suspected dogs was 32.36% (81/248). The overall occurrence of Staphylococcal pododermatitis from total dogs was 13.97% (32/2475) while the occurrence was 39.50% (32/81) in dogs affected with pododermatitis. The

results are shown in (Table 1 and 2).

The primary factors that have been shown to have major effects on the severity and variation of skin disorders are environment, climate and geolocation. They also depend upon the immunological status, age, breed and sex. Although to justify the lack of correspondence with other researchers may be due to the lack of awareness of owners about this condition. Nonetheless, these recorded observations were in contrast with Chhabra *et al.* (2020) [6] who reported an overall occurrence of pododermatitis to be 12.39% and Yevtushenko *et al.* (2021) [30] documented the overall occurrence of dermatological pathologies as 40.13% and that of pododermatitis was 13.79%.

Sex wise occurrence of Staphylococcal pododermatitis in dogs

The sex wise occurrence was investigated in 32 dogs suffering from pododermatitis. Out of the confirmed 81 cases, the occurrence was higher in male dogs *i.e.*, 43.18% (19/44) as compared to female dogs *i.e.*, 35.14% (13/37). A non-significant difference was observed in sex wise occurrence of Staphylococcal pododermatitis. The results are presented in (Table 03).

The present findings were corresponding with the work of Khurana *et al.* (2016) [10], Katariya *et al.* (2018) [9] and Chhabra *et al.* (2020) [6] who reported the prevalence more in male dogs in comparison with female dogs. Alternatively, Duclos (2008) [7] reported no predilection in sex of dogs suffering from pododermatitis. Lodh and Das (2013) [15] noted that the prevalence was more in female dogs as compared to male dogs. The higher occurrence in the male population of dogs over females may be due to the preference of people to own male pet companions for their more masculine appearance, greater vigour and lack of unintended pregnancies, or over presentation of male dogs to the clinics.

Table 1: Overall occurrence of pododermatitis in dogs

Particulars	Number screened	Number affected	Occurrence (%)
Total dogs	2475	81	3.27
Dogs suspected for pododermatitis	248	81	32.36

Table 2: Overall occurrence of Staphylococcal pododermatitis in dogs

Particulars	Number screened	Number affected	Occurrence (%)
Total dogs	2475	32	13.97
Dogs affected with Staphylococcal pododermatitis	81	32	39.50

Table 3: Sex wise occurrence of Staphylococcal pododermatitis in dogs

Sex	Number screened	Number affected	Occurrence (%)
Male	44	19	43.18
Female	37	13	35.14
$X^2 = 0.237^{NS}$ p value = 0.626 Non significant ($p > 0.05$)			

Age wise occurrence of Staphylococcal pododermatitis in dogs

The age wise occurrence was studied in 32 dogs of Staphylococcal pododermatitis. Out of the confirmed 32 cases, the occurrence in the dogs of age group <1 year, 1-3 years, 3-6 years and >6 years was 14.28% (02/12), 50.00% (13/26), 47.82% (11/23) and 33.33% (06/18). A non-significant difference was observed in age wise occurrence of Staphylococcal pododermatitis and the highest occurrence was recorded in 1-3 years age group. The results are presented in (Table 04).

The present findings were corresponding with the work of Kumar *et al.* (2006) [13] who reported the highest occurrence in dogs of one to three years of age. Alternatively, Kovacs *et al.* (2005) [11] documented highest occurrence was reported in older dogs of 4-8 years. Duclos (2008) [7] reported no predilection in age of dogs affected with interdigital lesions. In contrast, the occurrence was reported in young dogs of less than 1 year of age by Singh *et al.* (2012) [24], Khurana *et al.* (2016) [10] and Thapa and Sarkar (2018) [27]. The higher occurrence in the young population of dogs may become infected due to a lack of specific immunity and insufficient

epithelial development. Overcrowding, high body temperatures, and high nutritional needs can all make young

animals more susceptible to bacterial infections (Scott *et al.*, 1995) [22].

Table 4: Age wise occurrence of Staphylococcal pododermatitis in dogs

Age group (Years)	Number screened (n=81)	Number affected (n=32)	Occurrence (%)
<1	14	2	14.28
1-3	26	13	50.00
3-6	23	11	47.82
>6	18	6	33.33
$X^2 = 2.858^{NS}$ p value = 0.41 Non significant (p>0.05)			

Breed wise occurrence of Staphylococcal pododermatitis in dogs

The current study findings showed that Labrador Retriever was the most commonly affected breed with pododermatitis with 44.44% (12/27) occurrence, followed by Non-Descript with 41.67% (10/24) occurrence, Pug with 30.77% (04/13) occurrence and German Shepherd with the occurrence of 40.00% (02/05). Other breeds of dogs like Saint Bernard, Beagle, Pomeranian, Shih tzu breeds showed an occurrence of 33.33% (04/12) combined. The results are depicted in (Table 05).

The results of the present study partially resemble with Chhabra *et al.* (2020) [6], who reported the highest prevalence of pododermatitis in Labrador breed followed by Pug and Beagle breeds. On the contrary, Udayasree and Usha (2005) [29] and Tarafder and Samad (2010) [26] reported

that the highest occurrence was found in German Shepherd in dogs suffering from bacterial pododermatitis. On the other hand, Kumar *et al.* (2006) [13], Sarma *et al.* (2013) [21] and Thapa and Sarkar (2018) [27] observed that spitz breed were the most predisposed to dermatological disorders. Bouza-Rapti *et al.* (2023) [3] reported the maximum occurrence of mixed breed dogs with pododermatitis. The findings of this study align with those of Bajwa (2016) [1] who claimed that Labradors were more likely to get paw infections due to their broader paw bases and wider spaces between pads compared to Greyhounds. This characteristic increased the possibility that weight bearing, especially in large dogs, would be more prone to transferring to the hairy interdigital skin adjacent to the digital pads, causing discomfort and damage to the plantar paws.

Table 5: Breed wise occurrence of Staphylococcal pododermatitis in dogs

Breed	Number screened (n=81)	Number affected (n=32)	Occurrence (%)
Labrador Retriever	27	12	44.44
Non-descript	24	10	41.67
Pug	13	4	30.77
German Shepherd	5	2	40
Others (Saint Bernard, Beagle, Pomeranian, Shih tzu)	12	4	33.33
$X^2 = 4.2577^{NS}$ p value = 0.98 Non significant (p>0.05)			

Clinical signs of Staphylococcal pododermatitis in dogs

The clinical signs observed in the 32 dogs suffering from Staphylococcal pododermatitis is depicted in Table 06 and presented in Figure 01. Clinical examination revealed symptoms of licking in 17 dogs (53.13%), erythema in 14 dogs (43.75%), alopecia in 3 dogs (9.38%), hyperpigmentation in 4 dogs (12.5%), crustation in 4 dogs (12.5%), pustules/papules in 5 dogs (15.63%), bleeding in 2 dogs (6.25%), ulceration in 3 dogs (9.38%), interdigital nodules in 3 dogs (9.38%), lameness/limping in 2 dogs (6.25%) and swelling of paws in 3 dogs (9.38%).

The present findings were corresponding with the work of Chhabra *et al.* (2020) [6], Kumar *et al.* (2023) [21] and Thomas *et al.* (2024) [28] who reported pruritis, pustules, erythema and alopecia. Alopecia, hyperpigmentation, pyoderma, and sinus tracts with serosanguinous or seropurulent discharges in pododermatitis were also documented by Swaim *et al.* (1991) [25]. However, these findings were in contrast with Scott and Miller (1992) [22, 23] who reported that salivary staining on pedal hairs and paronychia (in occasional cases) are prominent clinical signs in dogs suffering from pododermatitis. Among the clinical signs noted in the current investigation, licking and

erythema were the most common signs found in pododermatitis in dogs. When there is friction and moisture, the skin may deteriorate, soften and macerate. This condition was more likely to occur when the dog was prone to excessive licking. These symptoms, which included inflammation and pruritus, were connected to the growth of bacteria on the skin and the consequent release of bacterial toxins and enzymes (Leib and Monoroe 1997 and Loeffler *et al.*, 2011) [14, 16].

Table 6: Distribution of clinical lesions

Clinical signs	Frequency (n=32)	Percent
Licking/itching	17	53.13
Erythema	14	43.75
Pustule/papule	5	15.63
Hyperpigmentation	4	12.50
Crustation	4	12.50
Alopecia	3	09.38
Ulceration	3	09.38
Interdigital nodules	3	09.38
Swelling	3	09.38
Bleeding	2	06.25
Lameness/limping	2	06.25



Fig 1: Clinical signs of Staphylococcal pododermatitis (a) Erythema (b) Pustule (c) Alopecia (d) Crust (e) Swelling (f) Ulcer

Number of paws affected with Staphylococcal pododermatitis

The number of affected paws and their percent incidence are displayed in table 10 and figure 07. In the current study, it was discovered that the least number of paws affected with Staphylococcal pododermatitis were all four paws (75%) followed by two paws (18.75%) and one paw (6.25%).

The result of the present study was consistent with Chhabra *et al.* (2020)^[6] who reported that lesions were most common on all four paws (61.61%), followed by two paws (28.28%) and one paw (10.10%). This was also in accordance with Breathnach *et al.* (2008)^[5], observed that lesions on all four paws were present in 18/20 cases of pododermatitis. A study by Breathnach *et al.* (2005)^[4] reported that 90% of dogs suffering from chronic pododermatitis showed lesions on all four feet. In a study of 300 cases, 54% of dogs were found to have had pododermatitis affecting all four feet, while 46% of dogs had it localized to one or two paws (Bouza-Rapti *et al.*, 2023)^[3]. Conversely, Yevtushenko *et al.* (2021)^[30] found that dogs most frequently had damage to two paws (53.3%). All four extremity pathology was more common (26.7%), but inflammation of one or three paws was more infrequent (12.5% and 6.2%, respectively).

The number of paws affected by the bacterial pathogens is not influenced by the position or anatomical location of the paws. This study concluded that bacterial infections, when present, typically affect all of the dog's feet. While single or dual paw involvement may occur, it is not commonly observed. Possible explanations are the heaviest body weight load in the front feet, the increased possibility of trauma (Nuttall, 2019)^[20]

Table 7: Number of paws affected with Staphylococcal pododermatitis

Number of paws affected	No. of dogs	Occurrence (%)
All four paws	24	75.00
Two paws	6	18.75
Only one paw	2	06.25

Conclusion

The demographic study on Staphylococcal pododermatitis in dogs revealed the overall occurrence to be 13.97%. Males were more affected than females and 1-3 years of dogs were

more susceptible than the other age groups. Labrador retriever was the most predisposed breed followed by non-descript and the least predisposed breed was observed to be pug. The clinical signs that were the predominantly presented were licking and erythema in all four paws.

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