Evaluation of cytology collection techniques and prevalence of Malassezia yeast and bacteria in claw folds of normal and allergic dogs

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Background – Canine bacterial and Malassezia paronychia are common secondary complications of atopic dermatitis and adverse food reactions.

Hypothesis/Objectives – The aim of this study was to compare three different sampling methods for claw fold cytology and to evaluate the numbers of bacteria, Malassezia yeast and inflammatory cells.

Animals – Sixty client-owned dogs were classified into three groups: (A) normal dogs; (B) allergic dogs with no clinical evidence of claw disease (brown staining, erythema, swelling, crusts or exudates); and (C) allergic dogs with clinical paronychia.

Methods – A prospective, blinded, split-plot study design was used. Claw folds from each dog were sampled using either a toothpick, tape preparation or direct impression smear. Slides were evaluated by two investigators for inflammatory cells, nuclear streaming, debris, corneocytes, yeast, intracellular (IC) cocci, extracellular (EC) cocci, IC rods and EC rods. For each parameter, data were compared between groups and between methods. Inter-reader agreements were calculated.

Results – Group C had significantly higher values of EC cocci and corneocytes than Groups A or B. Although Malassezia organisms were more prevalent in allergic dogs than normal dogs, the counts were not significantly different. There were significantly higher numbers of Malassezia organisms ($P = 0.0016$) and EC cocci ($P = 0.0106$) retrieved from samples collected with a toothpick compared to other methods. Tape preparations were associated with significantly more debris and corneocytes (both $P < 0.0001$) and impression smears with significantly more nuclear streaming ($P = 0.0468$).

Conclusions and clinical importance – Sample collection using a toothpick optimizes the value of cytological results when sampling allergic dogs with clinical paronychia.

Introduction

Paronychia is defined as inflammation within the folds of tissue surrounding the claw and occurs secondary to many infectious and inflammatory diseases.\(^1\) Of the infectious causes, bacteria are most often implicated and considered secondary to other causes or disease.\(^2\) Malassezia paronychia is a common secondary complication of canine atopic dermatitis (CAD) and cutaneous adverse food reaction (CAFR).\(^3\) Malassezia paronychia is typically characterized by a dark, brown to red discolouration and a dry to moist waxy exudate affecting the proximal aspect of the claw base. Pruritus is a common feature.\(^2\) Treatment intervention for bacterial and yeast overgrowth or infection typically results in a reduction in the number of organisms, a resolution of infection and subsequent reduction in the level of pruritus.

There is a paucity of information available on bacterial populations of the canine claw fold. A study of dogs in which claw disease was the only clinical sign reported cytological evidence of bacteria in 11 of the 24 dogs (46%).\(^4\) Adverse food reactions were present in four dogs in that study; however, it is unclear whether any of these four were the same dogs that had bacteria identified. No previous study has specifically evaluated bacterial populations in the claw folds of normal or allergic dogs.

Studies designed to evaluate different cytological techniques for examination of the claw fold surface are also limited. Two techniques have been reported: direct impression smear with a glass slide and use of a cotton swab to retrieve exudate from the subungual fold.\(^3\)–\(^5\) Anecdotal reports suggest that transparent acetate tape preparations and toothpick techniques are also used commonly in veterinary clinical practice. To the best of the authors’ knowledge there have been no controlled studies to compare these collection techniques; further, expected counts of bacteria and Malassezia yeast from
within the claw fold have not yet been established. Determination of the most effective technique for cytological sampling may enhance diagnostic accuracy and improve the management of paronychia secondary to allergic disease.

The aims of this study were to compare three different sampling methods for cytological evaluation of the skin surface of the subungual claw fold, and to quantify the number of Malassezia yeast, bacteria and inflammatory cells residing at this site.

Materials and methods

Study subjects and enrolment

This study was designed as a prospective, randomized, blinded, split-plot study. Sixty client-owned dogs were classified into three groups based on information obtained from physical examination, anamnesis and a questionnaire provided by the owners. Group A dogs had no history of skin or ear canal disease nor gastrointestinal disorders as defined by published criteria.6,7 Group B dogs had confirmed CAD and/or CAFR with no clinical evidence of claw disease (lack of brown staining, erythema, swelling, crusts, waxy debris and exudates). Group C dogs had confirmed CAD and/or CAFR with clinically apparent paronychia. The diagnosis of atopic dermatitis (AD) was confirmed by clinical signs which fulfilled at least six of Favrot’s seven criteria.6 Atopic dogs were required to have a history of strictly seasonal pruritus or have completed an elimination diet trial using either a home-cooked or a commercial novel or hydrolysed protein diet for a minimum of 8 weeks to rule out CAFR. The diagnosis of CAFR was confirmed as continuous pruritus that decreased when an elimination diet was fed and then increased within 2 weeks after feeding the dog the original diet. A minimum pruritus visual analog score (PVAS)9 of 4/10, applied specifically as a measure of pedal pruritus, accompanied by brown staining, erythema, swelling, crusts, waxy debris or exudates affecting the claw fold was required for dogs to be included in Group C; see Figure 1.

Dogs were excluded from the study if they had been bathed or had any topical products applied within the 7 days prior to enrolment. The minimum drug withdrawal time prior to enrolment was as follows: 14 days for oral antibacterial agents and antifungals; 28 days for oral glucocorticoids; and 56 days for injectable glucocorticoids. All owners signed an informed consent form prior to enrolment in the study.

Sample collection and preparation

From each dog, samples were collected from adjacent areas of the most proximal aspect of each affected claw fold using three techniques (toothpick, tape preparation and impression smear). If no claws were clinically affected, samples were collected arbitrarily from the claw fold of the third digit of the left front and hind paws. One glass slide was used for each technique per animal, giving a total of 180 slides. The order of techniques was randomized to account for any variation in the same area being sampled multiple times.

For the toothpick technique the skin around the claw fold was everted and samples were obtained by inserting the sharp edge of a toothpick (Poly King Products; City of Industry, CA, USA) into the dorsal claw fold (Figure 2). The area was scraped gently three times. For the tape preparation method a piece of clear acetate tape (Scotch; St. Paul, MN, USA) was applied successively to the most proximal region of the claw fold three times, then placed sticky-side down on a glass slide. The impression smear technique involved applying pressure with a glass slide directly onto the claw fold and partially evert the fold with the slide to obtain material from the underlying fold.

With the exception of the tape preparations samples were placed on glass slides which were air-dried, heat-fixed and stained using Diff-Quik® (Medical Chemical Corporation; Torrance, CA, USA). Three drops of Sub-X® Mounting Medium (Surgipath Medical Industries, Inc.; Richmond, IL, USA) were applied to facilitate attachment of a coverslip. The tape preparations were not heat-fixed and 0.1–0.2 mL of the (basophilic) thiazine dye of Diff-Quik® Solution stain was injected under the tape. The slides were turned over and pressure applied to the back to allow excess dye to diffuse. All slides were stored in a slide box at room temperature (68–72°F) and coded randomly prior to evaluation by blinded investigators.

Cytological examination

The two investigators independently evaluated all slides at low power (4x and 10x magnification) and scanned for areas of cellular material in the following order of priority: the presence of inflammatory cells, nuclear streaming, debris and keratinocytes. Once a site was selected, three areas were examined at ×100 magnification using an oil immersion lens – the initial site and two immediately adjacent fields within a 360° radius. Fields with no detectable keratinocytes, inflammatory cells or nuclear streaming were omitted. This procedure was repeated in three different areas representative of the entire slide based on the above scanning criteria, for a total of nine oil immersion fields (OIFs) for each of the 180 slides. For each OIF: yeast, intracellular (IC) cocci, extracellular (EC) cocci, IC rods and EC rods were counted and recorded on a cytology data form. The

Figure 1. Paronychia. Group C dog with brown staining, erythema, swelling, crusts and waxy debris in the claw fold.

Figure 2. Toothpick sampling method.
counts were coded arbitrarily up to a prespecified maximum of 30, so that any field containing >30 organisms was counted as 30. Corneocytes were scored as 1 (rare 0–1/OIF), 2 (low 2–3/OIF), 3 (moderate 4–7/OIF) or 4 (high >7/OIF). For each OIF, polymorphonuclear leukocytes (PMNs), nuclear streaming and debris were scored as present (1) or absent (0). All scores were summed across the nine OIFs for each slide and inter-investigator agreement was assessed. The sums were then averaged over both investigators prior to analysis.

Statistical analyses
All analyses were performed using SAS v9.3 (SAS Institute, Cary, NC, USA). A nested analysis of variance model was used for analysis of all variables. The full model included three factors: group, dog and method. Group was a whole-subject factor although all three methods were repeated within each subject (split-plot factor). Dog was nested within group. If a significant interaction between group and method was found, then method differences were examined separately for each group. Multiple comparisons were adjusted for using Tukey’s test and the significance threshold was set at 0.05. To assess inter-reader variability, pooled standard deviations were calculated on the paired readers values alternatively averaged and summed over nine fields for all variables. Pearson correlation coefficients were calculated for all variables between readers.

Results
Cytological examination
Yeast, EC cocci, EC rods, PMNs, nuclear streaming, corneocytes and debris were identified in all groups (Table 1). None of the slides contained IC rods. One of the slides (Group 1, toothpick) would not focus under oil immersion due to defective coverslip fixation. The coverslip was removed and both investigators scored and recorded data at the same time. Polymorphonuclear cells and/or nuclear streaming were identified on 13 of 180 slides (7.2%). Of these 13 slides, 11 had cocci, Malassezia or a combination of both present (five, one and five slides, respectively). Two of the 13 slides had PMNs and/or nuclear material without organisms.

Comparisons between groups
Least squares means and pooled standard errors by groups for each variable are provided in Table 1. Intracellular cocci were identified only in Group C. Group C dogs had significantly higher values of EC cocci and corneocytes than Groups A and B. Counts were not significantly different between Groups A and B. The mean pedal pruritus-specific PVAS scores were different (P = < 0.0001) between all groups: Group A (0.1/10 ± 0.007); Group B (3.7/10 ± 0.5); Group C (7/10 ± 0.34).

Yeast organisms were present in higher numbers in allergic dogs than normal dogs, but this difference was not statistically significant. One normal dog had up to 30 yeast/OIF identified with the toothpick and impression smear methods, despite a lack of pruritus or clinical signs of paronychia. Neither investigator identified Malassezia on tape preparations from this dog.

Comparison of sampling methods
There were significantly higher numbers of Malassezia (P = 0.0016) and EC cocci (P = 0.0106) retrieved from samples collected with a toothpick compared to the tape preparation and direct impression smear methods. Increased amounts of cell debris and corneocytes were observed with the tape preparation method (both P < 0.0001), and increased amounts of nuclear streaming were observed with the impression smear method (P = 0.0468). In general, it was more challenging to identify organisms on tape preparation samples as a consequence of background debris (Tables 2 and 3, Figure 3a–c).

Table 1. Least squares means and pooled standard errors by group. There were significantly more extracellular cocci and corneocytes for dogs in Group C (allergic dogs with clinical paronychia) compared to both Groups A and B (normal dogs and allergic dogs without clinical paronychia, respectively).

<table>
<thead>
<tr>
<th>Variable*</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yeast</td>
<td>6.83 ± 6.27</td>
<td>11.9 ± 6.27</td>
<td>24.99 ± 6.27</td>
</tr>
<tr>
<td>EC cocci</td>
<td>3.5 ± 7.4</td>
<td>0.62 ± 7.4</td>
<td>36.62 ± 7.4*</td>
</tr>
<tr>
<td>IC cocci</td>
<td>0 ± 0.33</td>
<td>0 ± 0.33</td>
<td>0.58 ± 0.33</td>
</tr>
<tr>
<td>EC rods</td>
<td>0.03 ± 2.14</td>
<td>0.06 ± 2.14</td>
<td>5.48 ± 2.14</td>
</tr>
<tr>
<td>IC rods</td>
<td>0 ± NC</td>
<td>0 ± NC</td>
<td>0 ± NC</td>
</tr>
<tr>
<td>PMNs</td>
<td>0.23 ± 0.11</td>
<td>0.03 ± 0.11</td>
<td>0.18 ± 0.11</td>
</tr>
<tr>
<td>Nuclear streaming</td>
<td>0.18 ± 0.17</td>
<td>0.1 ± 0.17</td>
<td>0.47 ± 0.17</td>
</tr>
<tr>
<td>Corneocytes*</td>
<td>24.33 ± 1</td>
<td>24.74 ± 1</td>
<td>30.55 ± 1*</td>
</tr>
<tr>
<td>Debris</td>
<td>3.46 ± 0.16</td>
<td>2.98 ± 0.16</td>
<td>3.13 ± 0.16</td>
</tr>
</tbody>
</table>

* P < 0.01 (nested ANOVA).
† Summed over nine fields and averaged over both readers.

Table 2. Least squares means and pooled standard errors by methods. Method 1, toothpick; Method 2, tape preparation; Method 3, impression smear.

<table>
<thead>
<tr>
<th>Variable*</th>
<th>1 versus 2</th>
<th>1 versus 3</th>
<th>2 versus 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yeast</td>
<td>0.0026*</td>
<td>0.0107*</td>
<td>0.8933</td>
</tr>
<tr>
<td>EC cocci*</td>
<td>0.0073*</td>
<td>0.2551</td>
<td>0.2997</td>
</tr>
<tr>
<td>IC cocci</td>
<td>1.0000</td>
<td>0.4411</td>
<td>0.4411</td>
</tr>
<tr>
<td>EC rods</td>
<td>0.9961</td>
<td>0.9172</td>
<td>0.9511</td>
</tr>
<tr>
<td>IC rods</td>
<td>NC</td>
<td>NC</td>
<td>NC</td>
</tr>
<tr>
<td>PMNs</td>
<td>0.8034</td>
<td>0.4501</td>
<td>0.8319</td>
</tr>
<tr>
<td>Nuclear streaming</td>
<td>0.6478</td>
<td>0.2557</td>
<td>0.0398*</td>
</tr>
<tr>
<td>Corneocytes*</td>
<td>&lt;0.0001*</td>
<td>0.9748</td>
<td>&lt;0.0001*</td>
</tr>
<tr>
<td>Debris*</td>
<td>&lt;0.0001*</td>
<td>0.8553</td>
<td>&lt;0.0001*</td>
</tr>
</tbody>
</table>

* P < 0.05 (nested ANOVA).

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Lo and Rosenkrantz

Figure 3. Comparison of three sampling methods for claw fold cytology for a subject in Group C (allergic dogs with clinical paronychia). Examples of Malassezia yeast are indicated with black arrows, cocci with red arrows and melanin with a yellow arrow. Diff-Quik\textsuperscript{6} Solution stain, 100 x. (a) Toothpick method showing \(> 30\) Malassezia organisms and cocci. (b) Tape preparation showing numerous Malassezia organisms and cocci. Note the significant amount of debris and high number of corneocytes. (c) Impression smear showing scattered Malassezia organisms, cocci and melanin.

Table 4. Inter-reader variability

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pooled Standard Deviation (Sum)</th>
<th>Pooled Standard Deviation (Average)</th>
<th>(r)</th>
<th>(P)-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yeast</td>
<td>14.82</td>
<td>1.65</td>
<td>0.88</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>EC cocci</td>
<td>16.52</td>
<td>1.84</td>
<td>0.88</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>IC cocci</td>
<td>2.69</td>
<td>0.30</td>
<td>1.00</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>EC rods</td>
<td>6.93</td>
<td>0.77</td>
<td>0.80</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>IC rods</td>
<td>NC</td>
<td>NC</td>
<td>NC</td>
<td>NC</td>
</tr>
<tr>
<td>PMNs</td>
<td>0.91</td>
<td>0.10</td>
<td>0.48</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Nuclear</td>
<td>0.76</td>
<td>0.08</td>
<td>0.69</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Corneocytes</td>
<td>5.68</td>
<td>0.63</td>
<td>0.76</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Debris</td>
<td>1.47</td>
<td>0.16</td>
<td>0.88</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

EC, extracellular; IC, intracellular; PMNs, polymorphonuclear leucocytes; NC, noncalculable because all values were zero. Pearson’s coefficient (\(r\)) interpretation: 0.00–0.25 little or no relationship, 0.25–0.50 fair, 0.50–0.75 moderate to good, >0.75 good to excellent.\textsuperscript{16}

**Inter-reader variability**

Table 4 lists the pooled standard deviations, correlation coefficients (1.0 indicates perfect positive correlation, –1 indicates perfect negative correlation) and associated \(P\)-values. All variables that could be calculated were significantly correlated between readers (\(P < 0.0001\)). Correlation for IC rods could not be calculated, because all values were zero. The highest correlation was with IC cocci (\(r = 1\)), and the lowest was with PMNs (\(r = 0.46\)). Correlations for yeast, EC cocci, EC rods, nuclear streaming, corneocytes and debris ranged from 0.69 to 0.88 between readers.

**Discussion**

In this study, Malassezia organisms were commonly retrieved from the subungal claw fold region of normal healthy dogs. As previously reported, these organisms should be considered resident microflora of the normal canine claw fold. This study also suggests that high numbers of yeast can be detected on cytological evaluation of the skin surface of the canine claw fold from allergic dogs in both the absence and presence of concurrent signs of pruritus and paronychia. Whilst the number of Malassezia organisms retrieved was higher in allergic dogs with clinical signs compared to allergic dogs with no clinical signs and normal healthy dogs, the counts were not significantly different between these three groups. This is an interesting observation and supports the hypothesis that a hypersensitivity reaction to Malassezia in allergic dogs may be more important as a contributory factor for pruritus than the actual number of yeast organisms present on the skin surface.\textsuperscript{2,10–12}

Significantly higher counts of EC cocci were found in claw folds of allergic dogs with clinical paronychia compared to normal and unaffected allergic dogs. Bacterial paronychia could be a key element of the higher pedal pruritus scores seen in this group and may have clinical implications for the successful reduction of pruritus in these cases.

When comparing the three sampling methods utilised for cytological evaluation of the claw fold region, our study suggests that the toothpick method is optimal for detecting yeast and coccoid bacteria. The toothpick provides a consistent, firm, pointed edge that is easily advanced into the claw fold. These findings contrast with those from a previous study which suggested that a tape preparation technique was more reproducible and accurate than other cytological methods for sampling yeast to confirm Malassezia dermatitis.\textsuperscript{13} This previous study did not, however, focus on the claw fold and the value of different collection techniques may vary with the location of sample collection. Another study evaluated a technique using the cut edge of a plastic cotton swab to gently scrape the claw fold of Devon Rex cats and cats of other breeds. Although the Malassezia yeast were of a different species in the cats, the number of organisms retrieved was comparable to the present study (8.63/OIF in Devon Rex cats and 0.59/OIF in other cats).\textsuperscript{5}

Results presented here also suggest that the toothpick technique yields samples that are easier to interpret. Tape preparations were associated with more debris and corneocytes, and occasional hair or air bubbles were evident. Utilizing the tape preparation method for cytological collection of the claw fold could limit the ability to identify bacteria and yeast accurately, which can contribute to pedal pruritus in clinical patients. One limitation of this study was that samples were not evaluated until all claws had been sampled over an approximate 12-month period. Samples collected with tape preparations earlier in the study may have faded during storage, leading to an under-
estimate of the number of organisms. The investigators compared the number of Malassezia organisms identified on tape preparations during the first and last three-month periods of the study, and 9 of 12 dogs (75%) had significant numbers of organisms identified in samples stored between 9 and 12 months (data not shown). Future studies could investigate the effect of duration of tape preservation on the quantification of microorganisms.

Impression smears were frequently associated with nuclear streaming secondary to cell lysis. The pressure required to obtain a sample using this method often ruptures inflammatory cells, especially neutrophils. The nuclear material streaks the slide and is readily identified under low power magnification.14 Nuclear streaming is common, because neutrophils are fragile and vulnerable to trauma, and this feature has been identified as a reproducible indicator of these cells in cutaneous impression smears.15 Typically, the presence of PMNs or nuclear streaming with intracellular bacteria supports true infection, as opposed to overgrowth.14 In this particular study, the number of slides identified with PMNs or nuclear material was small (13 of 180), so statistical analysis was not performed. However, the majority of these slides (11 of the 13) contained identifiable bacteria and/or yeast. The small number of slides containing nuclear material made it difficult to draw any conclusions regarding the possible significance of neutrophils or nuclear material in the claw fold together with bacteria or Malassezia yeast.

When evaluating inter-reader variability, with the exception of PMNs, most correlations between readers showed good to excellent agreement (r > 0.75).16 The interpretation of nine fields was considered to be representative of the slide overall. Some of the variability can be explained by the fact that the two investigators likely did not evaluate the same nine OIFs on each slide. With the exception of one slide, all were evaluated independently to provide a realistic representation of clinical practice.

In summary, this study demonstrates that sample collection using the toothpick method optimizes the value of cytological evaluation of the subungual claw fold in cases of clinical paronychia. This determination is useful for clinicians in selecting the most effective method to evaluate bacterial and yeast infections of the canine claw fold.

Acknowledgements
The authors would like to thank Deborah Keys for her assistance in statistical analysis and Mandy Burrows for providing feedback on our manuscript.

References
Lo and Rosenkrantz
deu deux investigator pour les cellules inflammatoires, les filaments de chromatine, les débris, les cornéocytes, les levures, les coques intracellulaires (IC), extracellulaires (EC), les bâtonnets IC et les bâtonnets EC. Pour chaque paramètre, les données étaient comparées entre les groupes et entre les méthodes. Les concordances inter-observateurs ont été calculées.

Résultats — Le groupe C avait des valeurs significativement plus élevées pour les coci EC et les cornéocytes que les groupes A ou B. Bien que les Malassezia soient plus prévalentes chez les chiens allergiques que chez les chiens sains, leurs dénombrements n’étaient pas significativement différents. Les nombres de Malassezia (P = 0.0016) et de EC coci (P = 0.0106) étaient significativement plus élevés lorsque prélevés à l’aide de cure-dents comparés aux autres méthodes. Les tests par celinephore étaient associés à un plus grand nombre de débris et de cornéocytes (P < 0.0001) et les calques par impression présentaient davantage de filaments de chromatine (P = 0.0468).

Conclusions et importance clinique — La méthode de prélèvement à l’aide d’une cure dent optimise la valeur des résultats cytologiques pour des prélèvements de chiens allergiques avec paronychie.

Resumen
Introducción — la paroniquia bacteriana y por Malassezia en perros son complicaciones secundarias comunes de la dermatitis atópica y de las relaciones alimentarias adversas

Hipótesis/Objetivos — el propósito de este estudio fue comparar 3 métodos diferentes de toma de muestras para la citología del pliegue de la uña y evaluar el número de bacterias, levaduras Malassezia y células inflamatorias.

Animales — 60 perros de propietarios privados fueron clasificados en tres grupos: (A) perros normales; (D) perros alérgicos sin evidencia de enfermedad de las uñas (tinción marronácea, eritema, hinchazón, costras o exudados); y (C) perros alérgicos con paroniquia clínica.

Métodos — se utilizó un estudio prospectivo, ciego, de subdivisión de grupos (split-plot). Los pliegues de las uñas de cada perro fueron muestreados utilizando bien un palillo de dientes, una preparación con cinta adhesiva, o una impresión directa en el porta. Los portas fueron evaluados por dos investigadores buscando células inflamatorias, estrías nucleares artefactual es, detritus, cornéocitos, levaduras, cocos intercelulares (IC), cocos extracelulares (EC), bacilos intercelulares (IC) y bacilos extracelulares (EC). Para cada parámetro los datos fueron comparados entre grupos y entre los métodos. Se calculó la similitud entre investigadores.

Resultados — el grupo C tuvo valores significativamente mayores de cocos extracelulares y cornéocitos que los grupos A o B. Aunque los organismos de tipo Malassezia fueron más prevalentes en los perros alérgicos que en los perros normales, los contajes no fueron significativamente diferentes. Hubo un número significativamente mayor de organismos tipo Malassezia (P = 0,0016) y cocos extracelulares (P = 0,0106) en las muestras tomadas con un palillo comparadas con otros métodos. Las preparaciones con cinta adhesiva se asociaron con presencia de mayor detritus y cornéocitos (ambos P < 0,001) y las preparaciones por impresión directa tenían mayor cantidad de estrías nucleares (P = 0,0468).

Conclusión e importancia clínica — la toma de muestras con un palillo optimiza el valor de los resultados citológicos cuando se toman muestras de perros alérgicos con paroniquia clínica.

Zusammenfassung
Hintergrund – Bakterielle Krallenbettinfektionen und Infektionen mit Hefepilzen sind häufige sekundäre Komplikationen bei atopischer Dermatitis und Futtermittelreaktionen.

Hypothese/Ziele – Das Ziel dieser Studie war ein Vergleich der drei unterschiedlichen Probeentnahmeverfahren für die Zytologie des Krallenfalzes und eine Evaluierung der Bakterienzahlen, der Malassezia Hefen und der Entzündungszellen.

Tiere – Sechzig Hunde in Privatbesitz wurden in drei Gruppen eingeteilt: (A) normale Hunde; (B) allergische Hunde ohne klinische Evidenz einer Krallenerkrankung (Braunfärbung, Erythem, Schwellung, Krusten oder Exudat); und (C) allergische Hunde mit klinischer Paronychie.


Ergebnisse – Gruppe C wies signifikant höhere Werte an EC Kokken und Corneozyten auf als die Gruppen A oder B. Obwohl Malassezia Organismen bei allergischen Hunden häufiger auftraten als bei normalen Hunden, waren die Zahlen nicht signifikant unterschiedlich. Es bestanden signifikant höhere Zahlen an Malassezia Organismen (P=0,0016) und EC Kokken (P=0,0106) in Proben, die mittels Zahnstocher im Vergleich zu den anderen Methoden entnommen worden waren. Die Klebestreifenpräparate zeigten signifi-
Canine claw fold cytology

要約

背景 — イヌの細菌性およびMalassezia性爪周囲炎はアトピー性皮膚炎や食物有害反応で一般的にみられる二次的な合併症である。

仮説/目的 — この研究の目的は爪管(claw fold)の細胞診の3つの異なるサンプリング方法を比較し、細菌、マラセチアならびに炎症細胞の数を評価することである。

供与動物 — 60匹の成犬を3つのグループに分類した：(A)正常犬，(B)爪疾患の臨床的な症状(茶色い着色、紅斑、腫脹、硬皮あるいは塗出物のないアレルギー犬(C)臨床的に爪周囲炎のあるアレルギー犬。

方法 — 前向き、無作為、分割研究デザインを用いた。それぞれのイヌの爪管(claw fold)を爪楊枝、テープ、あるいは直接押すスメアのいずれかの方法でサンプリングした。スライドは2人の調査者が炎症細胞、核遊走、崩壊物、角質細胞、酵母、細胞内(EC)球菌、細胞外(EC)球菌、IC桿菌ならびにEC桿菌を評価した。それぞれのパラメーターに対して、データをグループごとおよび方法ごとに比較した。評価者間の一致を計算した。

結果 — グループAあるいはBと比較し、有意に高いEC球菌数および角質細胞を示した。正常犬と比較し、アレルギーのイヌでマラセチア酵母菌の検出頻度は高かったが、数では有意差はみられなかった。爪楊枝を用いてサンプルを収集した方法は他の方法と比較し、マラセチア酵母菌の数(P = 0.0016)およびEC球菌の数(P = 0.0106)が有意に高かった。テープでのサンプリングは有意に多い崩壊物および角質細胞と関連しており(both P < 0.0001)、押すスメアは有意に多い核遊走と関連していた(P = 0.0468)。

結論および臨床的な重要性 — 臨床的に爪周囲炎があるアレルギー犬のサンプリング時には、爪楊枝を使用したサンプル収集が、細胞学的な結果の信頼度を最大限に得ることができる。

摘要

背景 — 犬細菌とマラセチア性甲溝炎は異位性皮膚炎と食物副反応常在の誘発疾。

仮説/目的 — 本研究の目的は、比較3種の異なる爪管細胞染色方法、および評価細菌、マラセチアおよび炎性細胞の数。

動物 — 60匹の成犬を3群に分類した：(A)正常犬、(B)過敏、(C)臨床表現甲溝炎の過敏。

方法 — 使用前観察、20匹/20群実験設計、分離用塩水/直圧染色3方法、涂片の方法、各群の爪管採取、2用を用意し、爪管採取方法を比較検証し、指標細胞、角質細胞、酵母、細胞内(EC)球菌、細胞外(EC)球菌、細胞内(IC)桿菌、細胞外(TE)桿菌、細胞内桿菌、細胞外桿菌、各群統計学的有意差を検討し、各群間の比較を行った。

結果 — 3群の細菌および角質細胞の数に有意差を認め、爪管採取方法で有意差を認め、塩水/直圧染色の比較検討を行った。

総結 — 使用爪管法検査は爪管炎の過敏性のある犬の3群に、その細胞学的結果が高い評価。

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e67