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SHORT COMMUNICATION

A new diet supplement formulation containing cranberry extract for the treatment of feline idiopathic cystitis

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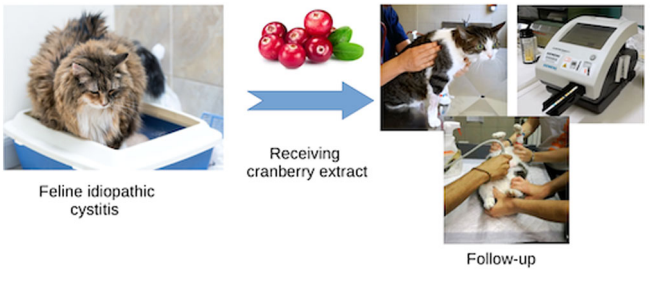
ABSTRACT

This study aimed to investigate whether cranberry extract could reduce lower urinary tract (LUT) and gastro-intestinal (GI) signs in feline idiopathic cystitis (FIC). Twenty-one client-owned cats were randomly allocated to two groups: a treated group (T, n = 10) receiving daily an oral nutritional supplement containing cranberry extract and a control group (C, n = 11). Owners were trained to recognise daily LUT and GI signs. Physical examination, urinalysis and bladder ultrasonography were performed at day 0 (T0), 15 (T15), 30 (T30), 60 (T60). Both groups showed an improvement for dysuria and periuria from T0 to T30 ($p < 0.05$), but only in cats of the T group, LUT signs disappeared at T60. A significant improvement in the T group was also observed for GI signs and bladder ultrasonography at T60 ($p = 0.03$). Urinalysis did not show any significant differences. This preliminary study suggests that cranberry could be effective in reducing LUT and GI signs in FIC.



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1. Introduction

The term 'feline idiopathic cystitis' (FIC) describes cats with acute/chronic irritative voiding clinical signs in which no specific cause can be identified using the appropriate diagnostic procedure (Buffington et al. 2006). Recent data suggest that cats with FIC showed not only local bladder alterations but also abnormalities of the nervous, endocrine, gastrointestinal (GI) and immune systems (Westropp and Tony Buffington 2004). To date, no drug has been proven to be certainly effective in the FIC management (Westropp and Tony Buffington 2004).

In human medicine, cranberry (*Vaccinium macrocarpon*) extract is used for treating and preventing urinary tract infections (UTIs) (Vasileiou et al. 2013). The preventing effect of UTIs provided by cranberry seems to be related to its high content of proanthocyanidins (PACs), a class of polyphenols that prevents the attachment of bacteria to the urothelium (Tempera et al. 2010). Moreover, cranberry extract inhibits the activity of cyclooxygenase-2 (COX-2) and suppresses the release of C-reactive protein, tumour necrosis factor-α and several pro-inflammatory interleukins involved in the inflammatory process (Côté et al. 2010; Vasileiou et al. 2013).

Based on the above-reported evidence, the aim of this study was to investigate for the first time the efficacy of a nutritional supplement containing cranberry extract in reducing lower urinary tract (LUT) and GI signs in cats with FIC.

2. Results and discussion

The evaluation of PACs content in cranberry extract showed a total of 290 mg/g (29.1%) of PACs, which is one of the highest amounts of PACs reported on the market (Occhipinti et al. 2016). Moreover, PACs content in each tablet was 11.5 mg/g of tablet, which is in accordance with the dosage used by Nieradka (2019) in a previous study in cats with FIC.

A total of 21 cats fulfils the inclusion criteria and were examined at day 0 (T0), 15 (T15), 30 (T30) and 60 (T60). Three cats in C group developed bacteriuria at T15 and T30 and they were excluded from the study.

LUT and GI signs observed at each experimental time are summarized in Table S3. Cats of the T group showed a significant decrease in dysuria, periuria and hematuria after 15 days while no LUT signs were observed at T30 and T60 ($p < 0.025$). These findings are in accordance with Nieradka (2019) who reported a significant improvement of FIC clinical signs after the administration of a diet supplement containing cranberry for 21 days. These positive effects seemed to be due to the anti-adhesive properties of A-type PACs and to the anti-inflammatory properties of the complex oligosaccharides such as xyloglucans and pectins. All of these low-molecular weight oligomers can be easily absorbed into the blood from the digestive tract and then filtered by the kidneys, reducing urinary tract inflammation and severity of FIC clinical signs by suppressing the inflammatory signal transduction pathway (e.g. COX-2 or cytokines) and by avoiding uropathogens adhesion (Coleman and Ferreira 2020). Compared to the T group, more control cats showed dysuria and periuria at T30 ($p < 0.003$ and $p = 0.01$, respectively) and T60 ($p < 0.001$) even if an improvement was observed between T0 vs T15 and T0 vs T30 ($p < 0.05$). An initial improvement of urinary clinical signs after 7 days in non-obstructive FIC cats was also observed by Nieradka (2019) and

this can be due the normal physiopathology of FIC which is a self-limiting disease with clinical signs typically lasting 5-7 days (Defauw et al. 2011).

Regarding GI signs, no significant differences were recorded within the C group among different experimental times ($p > 0.05$). In the T group, a significant decrease was observed in constipation, vomit and diarrhoea between T0 and T60 ($p = 0.03$). Comparing the C and T group a significant difference was highlighted for constipation at T60 with a higher number of symptomatic cats in the C group ($p = 0.03$). No previous studies are available on the effect of cranberry in small animal GI diseases but in human medicine it has been proven that cranberry's high content of antioxidant phenolic compound and complex oligosaccharides could positively modulate gut microbiota, reducing the severity of intestinal inflammation and oxidative stress (Monk et al. 2016; Coleman and Ferreira 2020).

Based on ultrasonographic examination, significant decrease in the number of hyperechoic structures within the urinary bladder was found in the T group when compared to the C group at T60 ($p = 0.04$). However, the subjective evaluation and the different bladder repletion state made these data difficult to interpret.

In the T and C groups, pH (6.5 and 6.6 on average, respectively) and urine specific gravity (USG-1042.4 and 1043.6 on average, respectively) were within the physiological range. Urinalysis and urine sediment examination did not show any statistically significant differences between the C and T groups or within the same group at different experimental times ($p > 0.05$). This in contrast with Nieradka (2019) who recorded increased pH and USG in non-obstructive-FIC affected cats with presence of proteins at T0 followed by a progressive improvement after the administration of cranberry.

In conclusion, this preliminary study, supports the use of cranberry extract in the therapy of FIC. Further studies with a larger number of cats, a placebo group and a longer observational time are needed to overcome the limits of this trial and to better understand the effects of this diet supplement.

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Disclosure statement

One of the authors, Elisa Martello, is a scientific consultant for the Candioli Pharma S.r.l. This interest has been fully disclosed to Taylor & Francis.

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References

Buffington CAT, Westropp JL, Chew DJ, Bolus RR. 2006. Risk factor associated with clinical signs of lower urinary tract disease in indoor-housed cats. J Am Vet Med Assoc. 228(5):722–725.

Coleman CM, Ferreira D. 2020. Oligosaccharides and complex carbohydrates: a new paradigm for cranberry bioactivity. Molecules (Basel, Switzerland). 25(4):881.

Côté J, Caillet S, Doyon G, Sylvain JF, Lacroix M. 2010. Bioactive compounds in cranberries and their biological properties. Crit Rev Food Sci Nutr. 50(7):666–679.

Defauw PAM, Van de Maele I, Duchateau L, Polis IE, Saunders JH, Daminet S. 2011. Risk factors and clinical presentation of cats with feline idiopathic cystitis. J Feline Med Surg. 13(12): 967–975.

Monk JM, Lepp D, Zhang CP, Wu W, Zarepoor L, Lu JT, Peter Pauls K, Tsao R, Wood GA, Robinson LE, et al. 2016. Diets enriched with cranberry beans alter the microbiota and mitigate colitis severity and associated inflammation. J Nutr Biochem. 28:129–139.

Nieradka R. 2019. The use of cranberry extract and glucosamine in the treatment of lower urinary tract infections in small animals. PART II. Urinary tract infections in cats. Vet Life. 4 :41–44.

Occhipinti A, Germano A, Maffei ME. 2016. Prevention of urinary tract infection with Oximacro®, a cranberry extract with a high content of A-type proanthocyanidins: a pre-clinical double-blind controlled study. Urol J. 13 (02):2640–2649.

Tempera G, Corsello S, Genovese C, Caruso FE, Nicolosi D. 2010. Inhibitory activity of cranberry extract on the bacterial adhesiveness in the urine of women: an ex-vivo study. Int J Immunopathol Pharmacol. 23 (2):611–618.

Vasileiou I, Katsargyris A, Theocharis S, Giaginis C. 2013. Current clinical status on the preventive effects of cranberry consumption against urinary tract infections. Nutr Res. 33(8):595–607.

Westropp JL, Tony Buffington CA. 2004. Feline idiopathic cystitis: current understanding of pathophysiology and management. Vet Clin North Am Small Anim Pract. 34(4):1043–1055.