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Evaluation of etiology, risk factors and clinical signs of feline lower urinary tract disease (FLUTD) in Northern Kerala#

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Abstract

Feline lower urinary tract disease (FLUTD) describes multiple ailments and diseases associated with bladder and urethra of cats. A total of 37 cats presented with clinical signs pertaining to lower urinary tract disorders were evaluated in the current study. There were 96.3 per cent males and 3.7 per cent females with maximum distribution in the age group between one to two years (p<0.01). Persian cats (p<0.001) were mostly diagnosed with FLUTD with occurrence of 75.68 per cent. Most of the cats (72.97 per cent) were diagnosed with feline idiopathic cystitis (FIC). The other causes of FLUTD diagnosed were bacterial cystitis (8.12 per cent), bladder rupture/ urine seepage (8.12 per cent), pseudomembranous cystitis (5.4 per cent) and urethral plugs (5.4 per cent). Dry diet and indoor habitat were found to be risk factors (p<0.001) for FLUTD. Clinical signs associated with lower urinary tract like stranguria, pollakiuria and periuria were commonly noticed.

Keywords: *Cat, FLUTD, feline idiopathic cystitis*

Feline lower urinary tract disease (FLUTD) forms considerable fraction of the total feline cases with a prevalence of three to eight per cent (Lund *et al.,* 2012). Feline lower urinary tract disease is an inclusive term encompassing a spectrum of dysfunctions of urinary bladder or urethra in domestic cats. FLUTD can be broadly classified into obstructive and non-obstructive uropathy (Hostutler *et al.,* 2005) which includes feline idiopathic cystitis (FIC), urolithiasis, urethral plugs, neoplasia, congenital anatomical abnormalities and behavioural and neurological disorders.

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Pollakiuria devoid of polyuria is among the most common clinical signs observed with FLUTD. Periuria involving pressure on the bladder is also a characteristic sign (Lew-Kojrys *et al.,* 2017). The cats which are affected with lower urinary tract (LUT) diseases are restless and often vocalize excessively (Forrester and Towell, 2015). Other clinical signs recorded with FLUTD include stranguria, hematuria, overgrooming of genital area and behavioral changes (Gunn-Moore, 2003). Diagnosis of lower urinary tract disease (LUTD) in cats involves an array of diagnostic work-up which includes urinalysis, urine culture, ultrasonographic evaluation, contrast radiography and occasionally cystoscopy (Eggertsdottir *et al.,* 2007). Feline idiopathic cystitis is observed to be the most common cause of LUTD among cats with a prevalence of 50 to 60 per cent of all FLUTD cases (Kim *et al.*, 2018; Hribova *et al.,* 2019; Kovarikova *et al.,* 2020; Nururrozi *et al.,* 2020). Diagnosis of FIC is based on exclusion of all other associated LUTD. It is a spontaneously occurring, non-infectious chronic disease of feline bladder with waxing and waning clinical signs (Jones *et al.,* 2021).

Regardless of the treatment and management, FLUTD has a high rate of recurrence. Cats with obstructive uropathy have a recurrence rate as high as 45 per cent within six months (Bovee *et al.,* 1979) whereas, cats with non-obstructive uropathy have a recurrence rate of 39 per cent within one year of initial presentation (Barker and Povey, 1973). The purpose of the study was to determine the occurrence of FLUTD and risk factors associated with FLUTD in Northern Kerala.

This study was undertaken for a period of 10 months between December 2021 to September 2022. A total of 459 cats were presented to small animal medicine out-patient unit, Teaching Veterinary Clinical complex, College of Veterinary and Animal Sciences, Pookode during this period. Among these, 37 cats were presented with complaints pertaining to lower urinary tract disease. Data regarding the age, breed, birth control measures, feed and water intake, housing environment and litter management were collected from owners through questionnaire method involving multiple-choice closed-ended questions. Urine sample was collected through cystocentesis or transurethral catheterization and was subjected to routine urinalysis and microbiological evaluation within 60 minutes of collection. Bacteriological culture was performed on brain-heart infusion agar followed by antibiogram using Muller-Hinton agar by double disc diffusion method (Murray and Zeitinger, 1983). The cats which showed bacterial growth (>10^3cfu/ml) for the urine sample were diagnosed as having bacterial cystitis. Abdominal ultrasonography was performed to evaluate the bladder and renal tissues (Griffen, 2020a; 2020b). The cats which were found negative for urinary bacterial culture and had no detectable abnormalities under ultrasonography (Fig. 1) were grouped as FIC. The data obtained was subjected to statistical analysis using chi-square test for goodness of fit.

A total of 37 cats with symptoms pertaining to lower urinary tract disease were evaluated in the current study. All the cats with LUT signs were intact with most of the cats being male (96.3 per cent). This observation was in accordance with Piyarungsri *et al.* (2020) who reported that male cats were greatly predisposed to FLUTD with prevalence rate of 43.6 per cent in intact males and 46.2 per cent in castrated males. Male cats are at an increased risk of acquiring obstructive FLUTD because of their long and narrow urethra. The disparity in the distribution of the cases in the current study with respect to neutering status may be due to lack of interest among owners to castrate their cats, as many among them reported their preference to use the cats for breeding purpose. The distribution of FLUTD among various breeds of cats is represented in Table 1. Highest occurrence was observed in Persian cats (75.68 per cent; $p<0.001$). This observation was in close accordance with Nururrozi *et al.* (2020) who reported that Persian cats suffer from FLUTD more frequently but, the results disagreed with Hribova *et al.* (2019) who reported that domestic shorthair were the most commonly susceptible breed. The highest occurrence in Persian cats in the current study may be due to preference of pet owners towards long haired breeds. Most of the cats with FLUTD belonged to the age group between one to

two years (59.46 per cent; p<0.01) (Table 2). This observation was in accordance with Lew-Kojrys *et al.* (2017) who documented that cats suffering from FIC were among the youngest population. Stranguria was recorded to be the most common clinical sign expressed by cats with FLUTD irrespective of the condition (91.89 per cent), followed by hematuria which was observed in 83.78 per cent of cats. Distribution of clinical signs with various LUTD are given in Table 3. In our study, FIC was observed to be the most common cause of FLUTD (72.97 per cent; p<0.001) which was in strong agreement with observations reported by many other authors (Kim *et al.*, 2018; Hribova *et al.,* 2019; Kovarikova *et al.,* 2020; Nururrozi *et al.,* 2020). Bacterial cystitis was diagnosed in three cats (8.12 per cent), bladder rupture/ urinary seepage in three cats (8.12 per cent), pseudomembranous cystitis in two cats (5.4 per cent) and urethral plugs (Fig. 2) in two cats (5.4 per cent). Mixed colonies of *Staphylococcal* spp. and *Escherichia coli* were identified upon bacterial culture of urine samples from cats with bacterial cystitis. Percentage distribution of diseases associated with feline lower urinary tract disease are given in Table 4.

Table 1. Breed-wise occurrence of FLUTD

Breed	No. of cats (n=37)	Per cent
Persian	28	75.68
Domestic short hair	2	5.4
Himalayan	3	8.12
Cross breed	4	10.81
χ^2-value = 50.892**; P-value < 0.001		

*** Significant at 0.01 level*

Table 2. Age-wise occurrence of FLUTD in cats

Age group	No. of cats (n=37)	Per cent
0-6 months	0	0
6 months – 1 year	7	18.92
1-2 years	22	59.46
> 2 years	8	21.62
χ^2-value = 11.405**; P-value = 0.003		

*** Significant at 0.01 level*

The data regarding various management practices are given in Table 5. The occurrence of FLUTD among cats raised exclusively indoor was 91.9 per cent (34 cats), outdoor was 2.7 per cent (one cat) and indoor cats with outdoor access was 5.4 per cent (two cats). This observation agreed with Kim *et al.* (2018) who documented those cats living in apartments had a higher risk for FLUTD. Twenty-four cats with FLUTD were fed exclusively dry food (64.86 per cent), four cats were fed with homemade food (10.81 per cent) and nine cats were fed with a combination of both dry and homemade food (24.32 per cent). Similar observations were made by Markwell *et al.* (1999) and Lekcharoensuk *et al.* (2001). Cats are not big drinkers of water and major fraction of their water intake is from food. Dry foods have lesser moisture content and exclusive consumption of dry food leads to dehydration and more concentrated urine which increased the risk of acquiring FLUTD. Twenty-one (56.76 per cent) cats with FLUTD had one or more than one cat in the household. The observation agreed with Cameron *et al.* (2004) who reported that cats which live with at least more than one other cat are most likely to have conflict with the housemate cat and they were more likely to acquire FIC compared to single household cats.

Table 3. Number (per cent) of cats with FLUTD which exhibited different clinical symptoms

	FIC	Bacterial cystitis	Bladder rupture / Urinary seepage	PC	UP
No. of cats	27 (72.98)	3 (8.12)	3 (8.12)	2 (5.4)	2 (5.4)
Hematuria	25 (92.6)	1 (33.33)	1 (33.33)	2 (100)	2 (100)
Stranguria	26 (96.3)	2 (66.67)	3 (100)	2 (100)	1 (50)
Pollakiuria	20 (74.04)	1 (33.33)	3 (100)	1 (50)	1 (50)
Periuria	23 (85.19)	0	2 (66.67)	1(50)	1 (50)
Vocalization	16 (59.26)	0	3 (100)	2 (100)	2 (100)
Obstruction	18 (66.67)	1 (33.33)	2 (66.67)	2 (50)	2 (100)

FIC = feline idiopathic cystitis, PC = pseudomembranous cystitis, UP = urethral plugs

Table 4. Occurrence of feline lower urinary tract disease

Disease	No. of cats (n=37)	Per cent
FIC	27	72.97
Bacterial cystitis	3	8.12
Bladder rupture/seepage	3	8.12
PC	2	5.4
UP	2	5.4
χ^2-value = 65.027**; P-value < 0.001		

*** Significant at 0.01 level*

FIC = feline idiopathic cystitis, PC = pseudomembranous cystitis, UP = urethral plugs

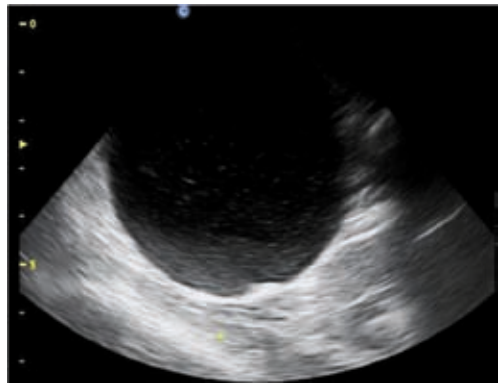

Fig. 1. Ultrasonographic image showing distended bladder with echogenic sediment

Fig. 2. Urethral plug

Summary

The current study revealed that Persian male cats (p<0.001) were at a greater risk for developing FLUTD. Feline idiopathic cystitis, urinary tract infections, pseudomembranous cystitis, bladder rupture/urinary seepage and urethral plugs were diagnosed in cats with lower urinary tract disease. FIC was the most common disease diagnosed (p<0.001) under FLUTD. Multi cat household, indoor living and dry food diet were the frequent findings in cats with FLUTD.

Table 5. Management factors associated with FLUTD

Variable	Number of cats (n=37)	Per cent	χ^2-value (P-value)
Neutered/spayed			
1. Yes	0	0	-
2. No	37	100	
Type of diet			
1. Dry food	24	64.86	17.568** (<0.001)
2. Homemade food	4	10.81	
3. Dry and homemade food	9	24.32	
Housing environment			
1. Indoor	34	91.9	57.135** (<0.001)
2. Outdoor	1	2.7	
3. Indoor with outdoor access	2	5.4	
Presence of other cats in household			
1. None	16	43.24	3.622^{ns} (0.164)
2. 1 – 2 cats	14	37.84	
3. > 2 cats	7	18.92	
Litter management			
1. Shared litter box	15	40.54	1.324^{ns} (0.250)
2. Individual litter box	22	59.46	

*** Significant at 0.01 level; ns non-significant*

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Conflict of interest

The authors declare no conflict of interest.

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