



Oscillometric evaluation of systemic blood pressure alterations in cats with urinary system disorders: a case-control study[#]

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Abstract

Systemic blood pressure alterations are commonly associated with renal and urinary system disorders and may significantly influence disease progression and prognosis in feline patients. The present study aimed to evaluate systolic and diastolic blood pressure in cats with urinary system disorders, with special reference to cats with urinary obstruction, and to compare the findings with healthy control cats. Blood pressure was measured using an oscillometric blood pressure monitor in clinically affected and control animals. Systolic blood pressure did not differ significantly between clinical cases and controls or between cats with urinary obstruction and healthy animals. In contrast, diastolic blood pressure was significantly lower in clinical cases compared to controls. These findings suggest preservation of systolic arterial pressure in cats with urinary disorders, while reduced diastolic pressure may reflect underlying azotaemia-associated vasodilatation and bradycardia. The study highlights the importance of routine blood pressure monitoring in feline urinary system disorders for early detection of haemodynamic alterations.

Keywords: Blood pressure, cats, urinary system disorders

Urinary system disorders are frequently encountered in feline clinical practice and include conditions such as feline lower urinary tract disease (FLUTD), acute kidney injury (AKI), chronic kidney disease (CKD) and urolithiasis. These disorders are often associated with systemic complications that can adversely affect cardiovascular function. Among these complications, alterations in systemic blood pressure are of particular clinical importance, as they influence disease progression, therapeutic decisions and patient survival.

Hypertension is a well-recognized complication in dogs with AKI, with reported prevalence ranging from 37 to 87 per cent, highlighting the need for routine blood pressure assessment at admission and during hospitalization (Monaghan et al., 2012). In contrast, the prevalence of hypertension in cats with AKI remains poorly defined and is likely under-recognized, emphasizing the importance of early detection and appropriate management.

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Chronic kidney disease is also commonly associated with systemic hypertension in both cats and dogs, irrespective of the stage of renal dysfunction (Acierno et al., 2018). In cats with urinary obstruction, however, blood pressure alterations appear to be more variable and may depend on the severity and duration of the obstruction. Canei et al. (2021) reported that cats in the early stages of urinary obstruction were more prone to developing hypertension, whereas prolonged or severe obstruction may result in hypotension secondary to bradycardia and severe azotaemia. Similarly, Neri et al. (2016) reported hypertension in approximately 30 per cent of cats affected with urethral obstruction.

Despite these findings, available information on blood pressure alterations in cats with urinary obstruction and other urinary system disorders remains limited and at times inconsistent. Therefore, the present study was designed to assess systolic and diastolic blood pressure in cats affected with urinary system disorders, with particular emphasis on urinary obstruction, and to compare these findings with those of healthy control cats.

The research work was conducted in ten cats of various ages, sexes, and breeds presented to the Teaching Veterinary Clinical Complex (TVCC), Pookode, Wayanad, Kerala during the period of April 2025 to November 2025. Cats exhibiting clinical signs such as polyuria, polydipsia, dysuria, anuria, stranguria, haematuria, periuria, urinary incontinence and vomiting were screened for urinary system disorders and included in the diseased group.

Six apparently healthy cats presented for routine health check-ups or vaccination, irrespective of sex or breed, with normal CBC, liver and kidney functions tests were selected as control animals.

Blood pressure was measured using an oscillometric blood pressure monitor (Pet Trust non-invasive BP monitor) (Fig. 1.). Animals were allowed to remain calm, motionless and comfortably positioned in either ventral or lateral recumbency throughout the procedure. An appropriately sized cuff was chosen so that its width covered approximately 30-40 per cent of the cat's limb circumference, and it was placed on the forelimb at a position close to the level of the heart base (Fig. 3). To minimize the effects of stress and movement, the first measurement was discarded. Subsequently, seven consecutive blood pressure readings were recorded, and the mean of these values was calculated and used for statistical analysis using an independent Student's t-test. Cats included in the study were divided into a clinical case group and a healthy control group. A subgroup analysis was also performed comparing cats with urinary obstruction to healthy controls.

The study group was diagnosed with different urinary system disorders including six cats with urethral obstruction, and one cat each with CKD, AKI, urolithiasis and chronic cystitis.

Mean systolic blood pressure (SBP) did not differ significantly between the clinical case group ($151.46 \pm$



Fig. 1: Pet trust oscillometric BP monitor



Fig. 2: Oscillometric BP cuff used in cats



Fig. 3: Applying cuff to the cat after making the animal calm



Fig. 4: BP measurement using pet trust oscillometric BP monitor

Table 1. Comparison of mean $\pm$ SE of blood pressure between study group and healthy controls

Parameter	Control (mean $\pm$ SE)	Study group (mean $\pm$ SE)	t-value	p-value
Systolic BP (mmHg)	155.17 $\pm$ 3.86	151.46 $\pm$ 10.83	0.322 ^{ns}	0.753
Diastolic BP (mmHg)	88.50 $\pm$ 2.31	75.06 $\pm$ 3.88	2.502*	0.025

*Significant at 0.05 level; ^{ns} non-significant

Table 2. Comparison of mean $\pm$ SE of blood pressure between cats with urinary and healthy controls

Parameter	Control (mean $\pm$ SE)	Cats with UO (n=6) (mean $\pm$ SE)	t-value	p-value
Systolic BP (mmHg)	155.17 $\pm$ 3.86	166.77 $\pm$ 11.57	0.951 ^{ns}	0.364
Diastolic BP (mmHg)	88.50 $\pm$ 2.31	80.35 $\pm$ 5.02	1.476 ^{ns}	0.171

^{ns} non-significant

10.83 mmHg) and the healthy control group (155.17 $\pm$ 3.86 mmHg), although SBP values were numerically lower in cats with urinary system disorders (Table 1). These findings indicate that systolic arterial pressure remained within normal limits in affected cats. Similarly, when cats with urethral obstruction were evaluated separately, no statistically significant differences in systolic blood pressure were observed compared with controls. In fact, obstructed cats showed a numerically higher mean SBP (166.77 $\pm$ 11.57 mmHg) than healthy cats, though this difference was not statistically significant (Table 2).

The maintenance of SBP in cats with urinary system disorders suggests the presence of compensatory cardiovascular mechanisms, particularly in the early stages of disease. This observation aligns with previous studies by Canei et al. (2021) and Acierio et al. (2018), who reported stable systolic blood pressure in cats with urinary obstruction and CKD, respectively. The lack of statistical significance may also be influenced by the limited sample size and variability in disease severity among cases.

In contrast to systolic pressure, diastolic blood pressure (DBP) was significantly lower in the overall clinical case group (75.06 $\pm$ 3.88 mmHg) compared to healthy controls (88.50 $\pm$ 2.31 mmHg) ($p < 0.05$). Although cats with urethral obstruction also exhibited reduced diastolic blood pressure (80.35 $\pm$ 5.02 mmHg), this decrease did not reach statistical significance when compared with controls. The significant reduction in diastolic blood pressure observed in the combined clinical group suggests that diastolic parameters may be more sensitive indicators of hemodynamic compromise in cats with urinary system disorders.

The reduction in diastolic blood pressure may be attributed to systemic vasodilation associated with azotaemia. Severe azotaemia can impair vascular tone and myocardial function, leading to reduced peripheral resistance and lower diastolic pressure. Previous studies have reported hypotension in advanced stages of urinary obstruction due to metabolic disturbances, electrolyte imbalances, and bradycardia (Canei et al., 2021). In the

present study, one cat with AKI and one cat with urethral obstruction were clinically assessed to be in the early decompensated stage of shock and exhibited reduced diastolic blood pressure (Chalifoux et al., 2021). These cases likely contributed to the overall decrease in diastolic blood pressure observed in the clinical group.

Contrastingly, Malouin et al. (2007) reported that 29 per cent of cats with urethral obstruction were hypertensive, with the remaining 71 per cent being normotensive. They also observed higher heart rates and pronounced electrolyte abnormalities in hypertensive cats. Similar observations were reported by Neri et al. (2016) and Monaghan et al. (2012). The discrepancies between these studies and the present findings may be explained by differences in disease stage, severity of obstruction and presence of systemic complications.

Overall, the findings of this study emphasize that while systolic blood pressure may remain preserved in cats with urinary system disorders, diastolic blood pressure alterations, particularly reductions can occur and may reflect early circulatory compromise. These results highlight the importance of routine and comprehensive blood pressure monitoring in cats with urinary disorders, not only for the detection of hypertension but also for identifying subtle hypotensive changes that may influence clinical decision-making, therapeutic interventions, and prognosis.

Summary

The findings of present study suggest that urinary system disorders in cats may be associated with subtle alterations in diastolic blood pressure, whereas systolic pressure appears to remain preserved, likely reflecting compensatory cardiovascular mechanisms.

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Conflict of Interest

The authors declare that they have no conflict of interest.

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