

**Research article**

**Prevalence of urolithiasis in goat attended at SAQ Teaching Veterinary Hospital in Chittagong**

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**ABSTRACT**

The study was conducted to determine the prevalence of urolithiasis in goat from January, 2008 to June, 2009 at SAQ Teaching Veterinary Hospital of Chittagong Veterinary And Animal Sciences University in Chittagong. A total of 2450 goats where Black Bengal goat were 513, Jamunapari were 1021, local were 542 and 374 cases were cross breed goat. The overall prevalence was found 1.51% including all types of goat breeds only in male. The highest prevalence (2.25%) was in Jamunapari goat and the lowest prevalence (0.55%) was in local goat. It was highest (83%) in Black Bengal at below 6 months of age and the lowest (8.69%) was in Jamunapari at 12-36 months of age. Among castrated animal, the highest prevalence (5.72%) was in Jamunapari goat and lowest prevalence (2.99%) was in local goat. But in uncastrated male, the highest prevalence (5%) was in cross breed goat and the lowest (1.30%) was in Black Bengal goat. In castrated male below 6 months of age, the highest prevalence (6.28%) was in Jamunapari and the lowest prevalence (2.08%) was in local goat, but in castrated above 6 months of age, the highest prevalence (5.26%) was in local goat and the lowest prevalence (2.50%) was in Black Bengal goat. In winter season, the highest prevalence (3.03%) was in cross breed goat and the lowest prevalence (0.56%) was in local goat. In summer, the highest prevalence (2.11%) was in local goat and the lowest prevalence (0.66%) was in Black Bengal goat. In rainy season, the highest prevalence (3.80%) was in Jamunapari goat and the lowest prevalence (0.71%) was in Black Bengal goat. In autumn, the highest prevalence (1.43%) was recorded in Jamunapari goat and the lowest prevalence (1.28%) was in Black Bengal goat. The epidemiological factors are responsible for prevalence of urolithiasis in different breeds of goat in Chittagong.

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**INTRODUCTION**

Urolithiasis is a condition of the urinary tract in which developing insoluble mineral and salt concretions and aggregating around a nidus of proteinaceous material within the bladder or urethra (Belknap and Pugh, 2002). These stones have many shapes and sizes and may consist of various mineral combinations. Formation of nidus occurs when mucoproteins in the urine coalesce and precipitate with crystals in

supersaturated urine (Belknap and Pugh, 2002). They are important because they induce urethral obstruction which in turn, may lead to complete retention of urine, distension of the bladder and even urethral perforation, rupture of the bladder and death (Baxendell, 1984). Urinary calculi may occur in all species of animals but are a common problem in domestic ruminants. It has been noted as more of a problem in castrated males (Nancy *et al.*, 1995;



Matthews, 1999; Blood et al., 2000 and Belknap and Pugh, 2002). It occurs mainly in castrated male goat and also in bovine, ovine, caprine, because of the common occurrence of urethral obstruction. Obstruction of the urethra is characterized clinically by complete retention of urine, unsuccessful efforts to urinate, distention of the bladder and the squeal of urethral perforation and rupture of the bladder. Various investigations have conducted to find out the causes, control measures and treatment of this condition in animals in different countries (Bellenger et al., 1981; Godwin et al., 1982; Sato et al., 1977). There is a peculiar characteristic of urethral process and sigmoid plexus in buck and ram which is not common in other species (Getty, 1967) with anatomical and clinical importance. This disease is more common in male due to much longer and narrower urogenital tract than doe (Getty, 1967; Nancy et al., 1995). Castration plays a vital role for the development of urethral passage as well as penis. Moreover, age of castration has direct relation to the occurrence of urolithiasis (Ghoshal et al., 1976). The formation of urinary calculi results when urinary solutes, mostly inorganic but sometimes organic, are precipitated out of solution. The factors which favor the urolithiasis are phosphate, silicate, oxalate salt of ammonium, calcium and magnesium, feeding of plants containing estrogen, oxalate and silica, heavy fluid loss, low water intake, urine stasis, low citrate content of urine, vitamin A deficiency,

*high grain diet, reduced urethral diameter etc.*  
Relationship between blood calcium level and urolithiasis has been carried out in Bengal goats (Hossain et al., 1978). Calculi may be formed in the renal pelvis from when they may be rolled down along the urinary passage. However, calculi have been recorded from the medullary and cortical region of the renal tubules (Singha et al., 1975) as well as from the corticomedullary junction (Singh et al., 1991). Smaller calculi formed either in the renal pelvis or in the bladder. The most common site of lodgment is the sigmoid flexure and urethral process (Jha et al., 1993;

Singh et al., 1991). The present study tried to relate some epidemiological factors (age, sex and breed) with feeding system, season and castration in urolithiasis.

**MATERIALS AND METHODS**

All data were collected from the case sheet (record sheet) kept in the SAQ Teaching Veterinary Hospital of Chittagong Veterinary and Animal Sciences University. Various animals with different disease conditions used to come to hospital. Basically, the study was focused on the caprine species for urolithiasis. Total of 2450 data were collected and analyzed. All data were collected considering some epidemiological factors like breed, age, sex, feed habit, castration and season. Black Bengal, Jamunapari, Cross and Local were the choice of breed. The total study period was 18 months, from January, 2008 to June, 2009.

All data were categorized considering breed, age, sex, season, castration and feed habit. The data were analyzed statistically with the aid of SPSS program (Statistical Program for Social Studies). Confidence interval at 95% was considered as level of significance (Zar, 1984).

**RESULTS AND DISCUSSION**

In this study, a total of 2450 goats were observed where 1013 were male (41.35%) and 1437 were female (58.24%) and urolithiasis was observed in 37 males and no positive case was found in females. The prevalence of urolithiasis was found 3.56% in males. The causes of higher incidence of lesions in male than female goats might be related to anatomical structure (Anon. 2014). In buck and ram there is urethral process that project beyond groove on the ventral surface of the corpus cavernosum. It's about 3 to 4 cm and 2 to 3 cm (Getty, 1967) beyond the glans penis forming a twisted process of urethra that is absent in female goat. The male urethra is much longer and narrower than doe. Similar findings were reported in male goats by scientists (Bellenger et al., 1981; Blood et al., 1989; Nancy et al., 1995; Sato et al., 1977).

**Table 1: The prevalence of urolithiasis in goat according to breed and age**

Age groups (Months)	Black Bengal			Jamunapari			Local			Cross			Total (Mean ± SE)	P-Value
	No. of animals	Prevalence (%)	Mean ± SE	No. of animals	Prevalence (%)	Mean ± SE	No. of animals	Prevalence (%)	Mean ± SE	No. of animals	Prevalence (%)	Mean ± SE		
0-6 months	5	83	0.23 ± 0.013	16	69	0.39 ± 0.015	2	66.67	0.22 ± 0.013	4	80	0.158 ± 0.012	0.153 ± 0.007	0.0042 *
6-12 months	1	16.67	0.19 ± 0.015	5	31.25	0.41 ± 0.019	0	0	0.23 ± 0.016	0	0	0.17 ± 0.015	0.15 ± 0.007	0.0015 *
12-36 months	0	0	0.21 ± 0.016	2	8.69	0.45 ± 0.019	1	33.33	0.20 ± 0.016	0	0	0.14 ± 0.014	0.15 ± 0.007	0.123 NS
36-60 months	0	0	0.18 ± 0.03	0	0	0.44 ± 0.04	0	0	0.26 ± 0.03	1	20	0.10 ± 0.02	0.15 ± 0.007	0.0841 NS

\*Significant NS= Not Significant



According to breed and age, the prevalence of urolithiasis was found 83% in Black Bengal, 69% in Jamunapari, 66.67% in local goat and 80% in cross breed goat at 0-6 months of age which was significant ( $P < 0.05$ ). There was no prevalence of urolithiasis in

Black Bengal, Jamunapari and local goat at 36-60 months of age which was non-significant (P value was 0.0841) (Table 1). There is higher prevalence of urolithiasis at early age of goat and Ghoshal et al. (1976) reported this similar finding.

**Table 2: The prevalence of urolithiasis in goat according to age of castration**

Age of castration	Breed	No. of animals	Positive cases	Prevalence (%)	P-value
Below 6 months	Black Bengal	65	4	6.15	0.978NS
	Jamunapari	191	12	6.28	
	Local	48	1	2.08	
	Cross	36	1	2.78	
Above 6 months	Black Bengal	40	1	2.50	
	Jamunapari	106	5	4.72	
	Local	19	1	5.26	
	Cross	20	1	5.00	

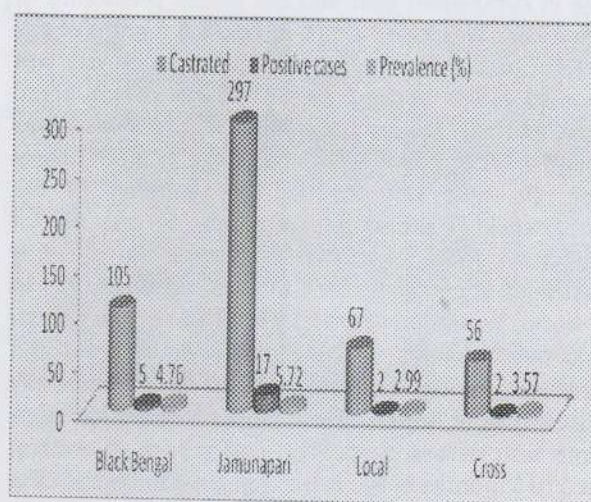
\*NS= Not Significant

**Table 3: The prevalence of urolithiasis in goat according to feeding system**

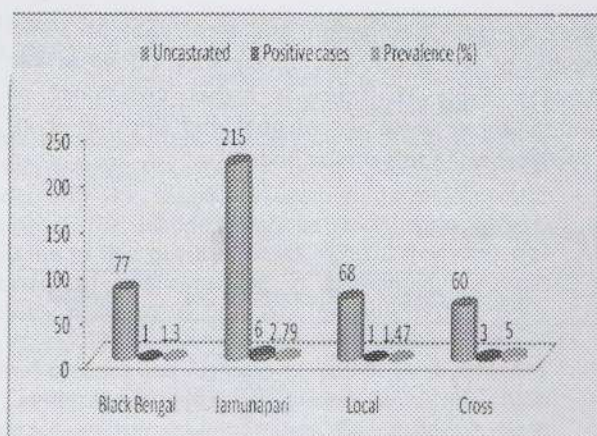
Feeding system	Breed	No. of Animals	Positive cases	Prevalence (%)	P-value
Concentrate & Pasture	Black Bengal	390	4	1.03	0.340NS
	Jamunapari	703	15	2.13	
	Local	362	2	0.55	
	Cross	212	3	1.42	
Pasture	Black Bengal	123	2	1.63	
	Jamunapari	318	8	2.52	
	Local	180	1	0.56	
	Cross	162	2	1.23	

\*NS= Not Significant

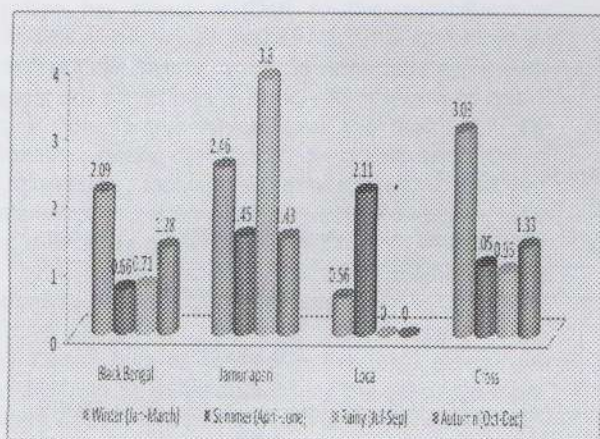
In case of castrated animal, the highest prevalence of urolithiasis was found 5.72% in castrated Jamunapari goat and the lowest prevalence of urolithiasis was found 2.99% in castrated local goat. The highest prevalence of urolithiasis was found 5% in uncastrated cross breed goat and the lowest prevalence of urolithiasis was found 1.30% in uncastrated Black Bengal goat. In this study, the prevalence of urolithiasis was higher in castrated male goat than uncastrated male goat. Similarly, Ghoshal *et al.* (1976) and Nancy *et al.* (1995) reported that the reason is the length and diameter of the uncastrated buck penis is significantly higher than the castrated buck penis which renders more chance of occurring urolithiasis in castrated buck (Fig 1).







**Fig 1: The prevalence of urolithiasis in goat according to castration**



**Fig 2: The prevalence of urolithiasis in goat according to season**

According to age of castration, the highest prevalence of urolithiasis was found 6.28% at below 6 months of age in Jamunapari goat and the lowest prevalence of urolithiasis was found 2.08% at below 6 months of age in local goat. The highest prevalence of urolithiasis was found 5.26% at above 6 months of age in local breed goat and the lowest prevalence of urolithiasis was found 2.5% at above 6 months of age in Black Bengal goat (P value was 0.978). The tendency of the occurrence of urolithiasis is related to the age of castration. Main factor that predispose the calculi is castration at an age below 6 months; especially at 1 to 4 weeks. Castration at an early age causes slow growth and development, resulting in a juvenile penis and urethra. Young castrated males are especially susceptible to urinary calculi because castration stops both testosterone production and growth of urethra. At 5 to 6 months of age is the high time to castrate the

goat, because the diameter of the urethra is properly expanded and urinary calculi deposition will be reduced in goat (Table 2). Ghoshal *et al.* (1976) reported the same findings.

According to concentrate and pasture feeding system, the highest prevalence of urolithiasis was found 2.13% in Jamunapari goat and the lowest prevalence of urolithiasis was found 0.55% in local goat (0.340) (Table 3). Wheat and wheat products are rich in phosphorus. Urinary crystals and casts were abundant in animals supplied with concentrates, which were high in phosphorus (Rahman *et al.*, 1999). However, intake of increased dietary phosphorus and magnesium may produce significantly reduced serum calcium (Hoar *et al.*, 1976). Elevated level of serum phosphorus and decreased level of serum Ca are related to the high phosphorus and low Ca content diet which causes increased excretion of these minerals through urine and may lead to formation of calculi (Godwin *et al.*, 1982).

According to pasture feeding system, the highest prevalence was found 2.52% in Jamunapari goat and the lowest prevalence was found 0.56% in local goat (Table 3). The pasture plants contain large quantities of oxalate, estrogen or silica. The most important factor in the development of siliceous calculi was the grass or roughage containing high level silica (Aiello, 1998; Bellenger *et al.*, 1981; Blood *et al.*, 2000; Blood *et al.*, 1989; Unanian *et al.*, 1985).

According to season, the highest prevalence of urolithiasis was found 2.09% in winter season and the lowest prevalence was found 0.66% in summer season in Black Bengal goat (Fig 2). The highest prevalence was 3.80% in rainy season and the lowest prevalence was found 1.43% in autumn in Jamunapari goat (Fig 2). The highest prevalence was found 2.11% in summer season and the lowest prevalence was found 0.56% in winter season in local goat and no prevalence was found in rainy and autumn season in local goat (Fig 2). The highest prevalence was found 3.03% in winter season in cross breed goat and the lowest prevalence was found 0.95% in rainy season in cross breed goat (Fig 2). The highest overall prevalence was found 8.15% in winter season and the second highest overall prevalence was found 5.47% in rainy season. Blood *et al.* (2000) reported that there is higher prevalence of urolithiasis in winter and rainy season than other seasons due to cold weather and limited intake of water. Meanwhile, the highest incidence of urolithiasis in ruminants during months of extreme winter and extreme summer which was reported by Lipismita *et al.* (2011) and this finding is more or less similar to present study.



## CONCLUSION

From the study it is revealed that the highest prevalence (2.25%) was in Jamunapari goat and the lowest prevalence (0.55%) was in local goat. The epidemiological factors like age, sex, breed, age of castration, season and feeding system are responsible for urolithiasis in goat. That's why management system should be improved for reducing the prevalence of urolithiasis in goat in Chittagong. However, further study is necessary with a higher number of goats under same management system to achieve more reliable results.

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