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Prevalence of Urolithiasis in Goat at Upazilla Veterinary Hospital, Feni, Bangladesh

Arup Ratan Sen[1], Nasima Akter[1*], Tanni Chandra[2], Sonnet Poddar[3]
[1]Department of Dairy and Poultry Science, Chittagong Veterinary and Animal Sciences University, Khulshi, Chittagong-2425, Bangladesh
[2]Department of Dairy Science, Patuakhali Science and Technology University, Dumki, Patuakhali, Bangladesh
[3]Department of Aantomy and Histology, Chittagong Veterinary and Animal Sciences University, Khulshi, Chittagong-2425, Bangladesh

Original Research Article

***Corresponding author**
Nasima Akter

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Abstract: Obstructive urolithiasis is a serious, potentially fatal disease condition which most commonly found in wether and breeding bucks. The present study was undertaken to identify the association of urolithiasis with age, sex, breed, feeding system and pH of urine of goat with their prevalence. Data from 278 goats at Upazilla Veterinary Hospital, Feni were recorded for this study. The prevalence of urolithiasis was found 6.67% in case of male and 0% in case of female and among different breeds Jamunapari showed the highest prevalence (42.86%). Goats within the age limit 0-6 months showed higher prevalance of urolithiasis than the later stage. Castration, one of the major risks for urolithiasis, showed considerably higher prevalence (64.29%) than the non-castrated one (35.71%). Other conditions like concentrate feeding and alkaline urine showed greater prevalance of urolithiasis (71.43% and 78.57% respectively) than the free grazing system and acidic urine (28.57% and 21.43% respectively). This study recommends proper feeding as a preventive measure to urolithiasis to compensate economic loss of farmers.
Key words: Prevalance, Urolithiasis, Goat, Upazilla Veterinary Hospital, Feni.

INTRODUCTION

Uroliths are concretions of solid mineral and organic compounds that cause disease through direct trauma to the urinary tract and obstruction of urinary outflow [7]. They are commonly found in the urinary bladder but have also been reported to occur in the urethra at the point of the sigmoid flexure [12] and urethral process [8].

Urinary calculi formation is complex and multifactorial [10] Decreased salt or water intake, urinary stasis, urinary tract infection, high urine pH (struvite, calcium phosphate, and calcium carbonate stones), vitamin A deficiency, and high estrogen intake have all been implicated as risk factors. In addition, the anatomy of the male ruminant urinary tract also contributes due to the potential narrowness of the passage and tortuous route. Urolithiasis is a common problem in castrated male sheep, goats and cattle (prior to 2 months of age) [9], the incidence in goats is the highest and has been reported to be about 49.3% [1]. Clinical signs of urolithiasis case will vary depending on the duration of obstruction, the site of obstruction, and whether a rupture has occurred. Early clinical signs associated with obstruction include signs of colic. Animals may have an arched stance, tread their feet, swish the tail, or kick at their belly [4]. Obstructive urolithiasis means the formation of calculi in the urinary tract with subsequent urinary blockage by uroliths [10], which is a life-threatening condition in males. Mortality rate is very high in affected animals due to rupture of the urethra or urinary bladder [5]. Management of urolithiasis is difficult task.Treatment choices for obstructive urolithiasis is varied, but resolution usually requires surgical intervention. Partial obstructions may be cured by diuresis, diet change and urine acidification. Analgesics and antibiotics are often indicated in these cases. Complete obstructions and urinary bladder ruptures require surgery.In these contexts, the study was carried out to identify the association of urolithiasis with age, sex, breed, feeding system and pH of urine of goat with their prevalence at Upazilla Veterinary Hospital, Feni, Bangladesh.

MATERIALS AND METHODS

Study areas and period

The study was conducted at Upazilla Veterinary Hospital, Feni, Bangladesh during July 2016 to June, 2017

Study population and data collection

A total of 278 goats were observed in which 14 goats were affected by urolithiasis. The urolithiasis in goats was diagnosed mainly based on the clinical history, clinical sings and physical examination. All the data were collected considering some epidemiological factors like presence of uroliths, breed, age, sex, castration, feeding system and urine pH.

Data analysis

According to sex, the total numbers of goats were divided into male (210) and female (74). There were found four breed – Black Bengal, Cross, Jamunapari and Local breed goats. The age group of the goat was divided into two groups – 0-6 months old goats and 7-12 months old goats. There were found two types of feeding system – concentrate and free grazing in this study goat. A descriptive analysis was carried out for the obtained data using STATA.

RESULTS

In this study, a total of 284 goats were observed in which 210 were male and 74 were female. The positive cases were found only in males (14). The prevalence of urolithiasis in goat was found 4.92% and in case of male the prevalence was 6.67% where the prevalence in female was 0% (Table 1)

Table-1: The prevalence of urolithiasis in goat according to sex

Sex	Total number of animals	Positive cases	Prevalence (%)
Male	210	14	6.67
Female	74	0	0
Total	284	14	4.93%

Out of the 14 positive cases the highest prevalence of urolithiasis was found in Jamunapari goat (42.86%) and the lowest prevalence of urolithiasis was seen in Local goat (7.14%) (Table 2)

Table-2: The prevalence of urolithiasis in goat according to breed

Breed	Frequency	Percentage (%)
Black Bengal	3	21.43
Cross	4	28.57
Jamunapari	6	42.86
Local	1	7.14
Total	14	100

For the age group, the prevalence was found higher in between 0-6 months than 7-12 months of age in all breeds (Table 3).

Castration, one of the major risk factors of urolithiasis showed 64.29% prevalence which was almost 2 times higher than the non-castrated one (35.71%) (Table 4).

In our study prevalance of urolithiasis were found higher in concentrate feeding (71.43%) compared to free grazing history (28.57%) (Table 5)

Table-3: The prevalence of urolithiasis in goat according to breed and age

Age (Months)	Black Bengal		Jamunapari		Cross		Local	
	No. of animals	Prevalence (%)	No. of animals	Prevalence (%)	No. of animals	Prevalence (%)	No. of animals	Prevalence (%)
0-6	2	66.67	5	83.33	2	50	1	100
7-12	1	33.33	1	16.67	2	50	0	0

Table-4: The prevalence of urolithiasis in goat in relation to castration

Castration history	Frequency	Percentage (%)
Yes	9	64.29
No	5	35.71

Table-5: The prevalence of urolithiasis in goat in relation to feeding system

Feeding system	Frequency	Percentage (%)
Concentrate	10	71.43
Free grazing	4	28.57

All the cases were divided into two categories where group 1 consists of goats had acidic urine (pH below 7) and group 2 consists of goats had alkaline urine (pH above 7). According to the pH of the urine, the highest prevalence of urolithiasis was seen in those having alkaline urine (78.57%) and the lowest (21.43%) was found in those with acidic urine (Table 6).

Table-6: The prevalence of urolithiasis in goat in relation to pH of Urine

pH	Frequency	Percentage (%)
Group 1	3	21.43
Group 2	11	78.57

DISCUSSION

The present study was undertaken to identify the association of urolithiasis with age, sex, breed, feeding system and pH of urine of goat with prevalence. In this study, a total of 284 goats were observed. Out of 284 goats 210 were male (73.94%) and 74 were female (26.05%). Out of 284 goats urolithiasis was observed in 14 males and no positive case was found in females. The prevalence of urolithiasis was found 6.67% in males. The cause of higher prevalence of urolithiasis in male goats compared to female goats, is simply due to the anatomy of the male urethra. In contrast to the relatively short, wide and straight urethra present in females, the male urethra is long, narrow, torturous and prone to obstructions, particularly in the sigmoid flexure and urethral process. These similar findings were also stated by the finding of Smith and Craig [2, 13].

Among different breeds of study, the highest prevalence of urolithiasis was found 42.86% in Jamunapari goat. According to age, the prevalence of urolithiasis were found 66.67% in Black Bengal, 83.33% in Jamunapari, 50% in cross breed of goat and 100% in local goat at 0-6 months of age which were higher than the age group 7-12 months of age, that supports the findings reported by Smith [13]. The underlying cause might be due to the underdeveloped (narrower) urethral process.

According to castration, the prevalence of urolithiasis was found 64.29% in castrated goat and 35.71% in uncastrated cases. The prevalence of urolithiasis was higher in castrated male goats, because early castration results in penile hypoplasia, leading to a decrease in the bore size of the urethra, as well as failure of the urethral process to mature and completely separate from its distal attachment to the preputial mucosa. Similar findings were found in the study of Smith [13].

According to concentrate and free grazing system, the prevalence of urolithiasis was found higher (71.43%) in goats under concentrate feeding system. Goats are commonly fed diets that exceed their caloric requirements, and popular diets often contain alfalfa hay, which is high in calcium and grains that tend to be high in phosphorus [11]. Uroliths are most common in goats fed high grain diets, which makes sense as calcium and phosphorus are often fed in excess [6].

According to pasture feeding system, the prevalence was also considerably high (28.57%). This might be due to 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 which was described by Radostits [10].

According to the pH of urine, the alkaline urine had the higher prevalence 78.57%, while 21.43% prevalence was found in cases of acidic urine. These findings were similar with Ewoldt [3] and Vengai Mavangira [14], reported that urinary pH is a major factor in urolith formation- both struvite and apatite uroliths precipitate mostly in alkaline urine.

CONCLUSION

The present study was conducted to find the prevalence of urolithiasis in relation with goat breed, age, sex, feeding, castration and pH of urine. The results found that males are more susceptible to urolithiasis due to their anatomical predisposition, Jamunapari breeds become more affected and goats within 6 months of age are more prone to urolithiasis. There is a positive correlation between castration and urolithiasis, goat with previous castration history becomes more affected than non-castrated one. Another most important factor in urolithiasis is feeding, concentrate feeding system causes higher frequency of urolithiasis. Urine with alkaline pH possesses greater risk of urolithiasis, which depends mainly on feeding system. Preventive measures are effective to struggle this, such as maintaining calcium and phosphorus ratio as 2:1, providing adequate amount of salt (4%) in diet to increase water consumption and urine volume. Finally screening should be done to categorize goats for early treatment.

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CONFLICT OF INTERESTS

All authors declared that they have no conflict of interests

AUTHORS' CONTRIBUTION

Arup Ratan Sen conducted the study and wrote the manuscript. Nasima Akter helped to write the manuscript. Tanni Chandra read and reviewed the manuscript. Sonnet Poddar helped in formatting the manuscript.

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