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| <p><b>Breed Predisposition Differences of Dogs with Urolithiasis in Tirana District</b></p>  |   |  | <p><b>Healthcare</b></p>   |
|  |   |  | <p><b>Keywords:</b> Urolithiasis, dogs, ammonium urate and cystine stones.</p> |
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| <p><b>Abstract</b></p>   |   |  |  |
| <p>Urolithiasis is a common problem in dogs. Uroliths can occur in any section of the urinary tract, but bladder uroliths are the most common. The differences in breed predispositions of forming different types of uroliths have been identified by different studies. Certain breeds of dogs are genetically predisposed to this condition and to the specific stone type formation. The purpose of this study was to report on the breed differences of 160 canine uroliths submitted to clinics and hospitals in Tirana from July 2013 to January 2017. From all the dogs taken in study 11 of them resulted positive for the presence of stones. From this study it was observed that Dalmatian breed had the highest number of cases, 3 dogs from 11 positive cases belonged to this breed. The other breeds with urolithiasis condition resulted German shepherd and Mixed dogs with 2 cases each and Miniature schnauzer, Terrier, Shih Tzu and Shetland Sheep dog with 1 cases each. In this article are also discussed some risk factors for the various uroliths formation, some recommendations for treatment and prevention. The monitoring of the dog with this condition predisposition on regular basis may help in early identification, treatment, and prevention of uroliths.</p> |   |  |  |

## Introduction

Urolithiasis is a common and often recurrent problem in dogs. Urolithiasis is a general term referring to stones located anywhere within the urinary tract and can develop in the kidney, ureter, bladder, or urethra. Mechanisms involved in stone formation are incompletely understood in dogs. However, three main contributing factors in this process are the 1. The matrix; the inorganic protein core may facilitate initial urolith formation, 2. Crystallization inhibitors; organic and inorganic crystallization inhibitors may be lacking or dysfunctional in animals with uroliths, and 3. Precipitation crystallization factors; a complex relationship among urine solutes and other chemical factors in the urine can lead to conditions favoring crystallization.

Struvite uroliths are the most commonly reported urolith in many studies worldwide [1,2,3]. Microscopic crystals associated with urolithiasis rarely cause clinical signs. The formation of macroscopic uroliths in the lower urinary tract irritates the mucosal surface and the clinical signs as: difficulty urinating (disuria), blood in the urine (hematuria), and painful urination (stranguria). Other clinical signs are abnormal urine stream, frequent urination, cloudy urine and increased thirst. Differences in breed predispositions to form different types of uroliths have been identified by different authors. Certain breeds of dogs are genetically predisposed to this condition and also about the specific stone type formation. Oxalate stones are more predominant in Lhasa apsos, urate stones in Dalmatians and English bulldogs, cystine stones in Newfoundlands, struvite and oxalate stones in miniature schnauzers and bichon frises.

According the literature, breeds frequently identified with struvite urolithiasis were the Miniature Schnauzers, Shih Tzus, Lhasa Apso, Yorkshire Terriers, and Pugs [4]. Dog breed at risk of the condition are the Pekingese and cocker spaniel [5].

The miniature schnauzer is believed to have an inherited abnormality of host defenses of the urinary tract, this situation increase the susceptibility to bacterial urinary tract infections [6,7]. Hereditary factors also may be associated with the increase of the frequency of struvite uroliths in beagles [8]. English bulldogs breed has a relatively high occurrence of ammonium urate and cystine stones, but a relative lack of struvite uroliths [4]. Some breeds have no known predisposition for the urolithiasis condition as Bernese Mountain dog for struvite stones, Bichon Frise, Bolognese, Tibetan Terrier for purine stones and French Bulldog for cystine stones.

### **Materials and Methods**

This study was conducted from the samples taken in 10 clinics and hospitals in Tirana district from July 2013 to January 2017. The samples are collected from dogs with urinary problems and with clinical signs of urinary tract as stranguria, hematuria etc.

The diagnosis was based on a combination of clinical signs with the collection of a full and adequate history by the owner of the dog in order to collect as much information as possible. The physical examination included palpation of the bladder and examination of external genitalia.

Animals that resulted positive with the urinary test and with confirmed presence of the stones were subjected to further medical and diagnostic procedures to clarify the type of stone and its composition.

From the questionnaire there are collected also important information about the diet of dog which is a very important factor that impacts the formation and the frequency of uroliths in the urinary tract. The breed of an individual was identified by the veterinarian based on the dog's physical appearance and/or the owner's statement.

### **Results and Discussions**

Any dog can experience urinary stones, but some breeds of dogs are predisposed to form certain kinds of stones. The purpose of this study was to identify the breeds more at risk for different types of canine urolithiasis in Tirana district. This study was conducted over the period from July 2013 to January 2017, the data were collected from 160 cases of dogs admitted into clinics and hospitals in Tirana district with urinary problems or with clinical signs of urinary tract.

From 160 dogs with urinary tract problems 11 resulted positive for canine urolithiasis.

| Breed               | Number |
|---------------------|--------|
| Miniature schnauzer | 1      |
| Terrier             | 1      |
| Shih tzu            | 1      |
| Dalmatian           | 3      |
| German shepherd     | 2      |
| Mix                 | 2      |
| Shetland sheep dog  | 1      |

Table Nr.1. Breed and the number of dogs found with urolithiasis condition

As we mentioned before the breed of dogs is one of the risk factors for the urinary tract stone formation. According the literature smaller breeds dogs are more likely to form urolithiasis [10]. The results of our study indicated that the Dalmatian was the breed with the highest number of cases, 3 dogs from 11 positive cases belonged to this breed. The other breeds with urolithiasis condition resulted German shepherd and Mixed dogs with 2 cases each and Miniature schnauzer, Terrier, Shih Tzu and Shetland Sheep dog with 1 cases each.

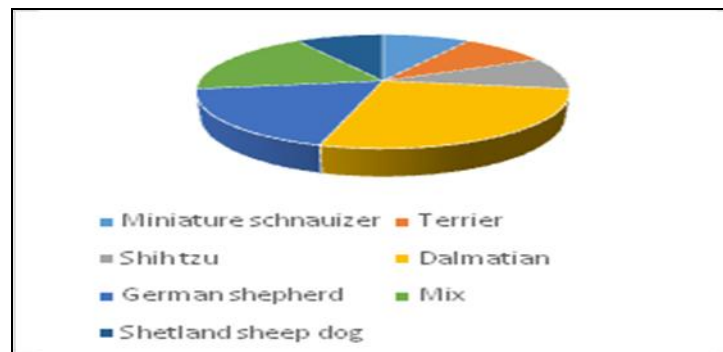


Figure. Nr.1. Graphical presentation of breeds resulted positive for urolithiasis.

Many Dalmatians cannot metabolize uric acid in their livers properly, leading to an excess of uric acid in the urine. Because uric acid is not very water soluble, it can form urate crystals, which may then coalesce into stones. Urate stones can also form in pets with certain liver conditions. The Dalmatian breed is at high risk of urolithiasis condition because he has a unique urinary tract system which makes them susceptible to the formation of urinary tract stones. The urine of a Dalmatian contains uric acid instead of urea or allantoin. Stones are formed from the salts of the uric acid. The formation of large stones will lodge in the urethra and the small stones, called gravel may pass with the urine. If the urinary tract becomes completely blocked and the condition is not treated promptly it will be fatal. In the Dalmatian, a defect of the uric acid transporter SLC2A9 alters hepatic and renal transport of uric acid this lead to abnormally high serum and urine concentrations of uric acid. Urinary uric acid excretion is approximately 10 times higher in

the Dalmatian breed than in other dogs, urate uroliths are formed only in a small percentage of Dalmatians, also this breed shows a lower risk of struvite calculi. The Dalmatian typically has a serum uric acid concentration 2–4 times higher than other breeds. English bulldog, Parson Russell terrier, and black Russian terrier may have a transporter defect; this is a mutation of the autosomal recessive trait for which affected individuals are homozygous, now a DNA test is available to confirm this defect.

Many abnormalities of the urinary system can be diagnosed from the clinical signs, history and physical examination findings, serum chemistry profile, urinalysis, and aerobic bacterial urine culture. The history taken from the owner should include information regarding changes in water consumption, frequency of urination, volume of urine produced, appearance of urine, and behavior of the animal. It is also important to obtain information about historical and current drug administration, appetite, diet, changes in body weight, and previous illnesses or injuries.

Patients with recurrent urinary tract infections should be evaluated to identify and correct the underlying risk factors, such as anatomic abnormalities (urachal diverticuli, vaginal recession, perivaginal dermatitis, neoplasia, polyps, strictures, granulomas etc.

Currently there are diets for dissolving struvite uroliths in dogs higher in fat and salt. It is important to take care about the feeding of the dogs with a tendency towards obesity, pancreatitis, hyperlipidemia, or salt-intolerant conditions such as heart and kidney disease. During the treatment of struvite uroliths it is important to administrate an appropriate antimicrobial treatment this because bacteria can be trapped within the matrix of a urolith. Bacteria are commonly reported in urine of dogs with this condition; the presumption is that the bacteria are being released from the inner portions of dissolving infection-induced uroliths. It takes approximately 14 week to dissolve infection-induced struvite uroliths and for the struvite uroliths 3 week [10,11]. Surgical removal may be the most prudent method of stone removal. Alternative methods of removal include voiding hydropulsion, catheter-assisted retrieval, and retrograde hydropulsion [12,13].

## Conclusions

Urolithiasis is an unpredictable disorder which is pretty often a combination of both pathological and physiological factors. The aim of this study was to identify breeds more at risk for different types of urolithiasis in Tirana district. The study was conducted from July 2013 to January 2015, with a total of 120 dogs with urinary problems from clinics and hospitals in Tirana district. From all the dogs, 11 of them resulted positive for the presence of stones. From the results of the study was observed that Dalmatian breed was the dog with the highest number of positive cases. It is important to discuss the risk factors for urolith formation with owners of dogs with predisposition of the condition and also to monitor the urine and radiographing on a regular basis.

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