B-4202
[1-5]

RESEARCH ARTICLE Indian Journal of Animal Research, Volume Issue : ()

Prospective Clinical Study on the Occurrence of Ovine Urolithiasis in Kashmir Valley of India

W. Firdous, J.D. Parrah, S. Bilal[1], H. Athar, M.D. Dar, N. Handoo

10.18805/IJAR.B-4202

ABSTRACT

Background: The study was conducted on confirmed sheep patients suffering from complete retention of urine.

Methods: A complete history regarding the age, breed and sex of the animal, castration, duration of illness, managemental practices, feeding habits of the animals, early signs of the disease, previous treatment, if any, were recorded.

Result: An overall incidence of 27.11% of obstructive urolithiasis was recorded in sheep. All these cases were intact rams with different age groups, weights and of different breeds. Highest (78.68%) incidence of ovine obstructive urolithiasis was recorded during winter season. Young lambs of 2-6 months of age were found most affected with obstructive urolithiasis (31.14%). Cross bred Kashmir Merino was most affected followed by cross bred corridale (18.3%) and non descript local breeds of ovine (8.9%). The highest (60.65%) cases were brought to the clinics 48-96 hours after the onset of the disease. The cases from far flung areas and hilly terrain were usually received as late as 120-144 hours of illness. The losses could be averted to a great extent by apprising the farmers about the preventive measures of the disease and imparting them training about the balanced feeding and good managemental practices of sheep rearing.

Key words: Kashmir merino, Occurrence, Sheep, Urine retention, Urolithiasis.

INTRODUCTION

Obstructive urolithiasis, the most widespread and economically important disease of animals, means the formation of calculi in the urinary tract with subsequent urinary blockade by uroliths (Radostits *et al*. 2007). The disease is reported worldwide and occurs in all species of the animals but has most frequently been recorded in feeder steer and lambs (Radostitis *et. al.* 2007). Onmaz *et. al.* (2012) found 1.08% prevalence of urolithiasis in Turkey. In India, urolithiasis has mostly been reported in bullocks, goat, sheep and buffaloes from different corners of the country (Amarpal *et al*. 2020). At Central Sheep and Wool Research Institute (CSWRI), Avikanagar farm a heavy overall incidence of 10.35% of urolithiasis among all the breeds of sheep has been reported (Sonawane *et al*. 2007). Urolithiasis has been attributed to be the fifth most prevalent cause of death in feedlots (Singh *et al.* 1981) and second biggest cause of death behind respiratory diseases accounting for 18 -38% of lamb deaths in winter (Bani et al. 2007; Vinodhkumar *et.al.,* 2010).

Urolithiasis is a multi-factorial condition due to combined influences of physiological, nutritional and managemental factors. It is mainly attributed to excessive or imbalanced intake of minerals (Larson, 1996; Radostits *et al*. 2007). Geographical and seasonal influences play an important role for range herds in semiarid areas (Gasthuys *et al*.1993). From Kashmir valley an overall incidence of 12 % cases of obstructive urolithiasis in male calves has been reported (Parrah *et al*. 2010). The scanned literature did not show any report on occurrence of obstructive urolithiasis in sheep reared under temperate agro climatic conditions of Kashmir. To fill this void the present study was undertaken to record the occurrence of obstructive urolithiasis in sheep.

Division of Veterinary Surgery and Radiology, F. V. Sc and A. H., SKUAST-K, Shalimar, Srinagar, Post Box NO-494, GPO Srinagar-190 001, Jammu and Kashmir, India.

[1]Division of Veterinary Biochemistry, F. V. Sc and A. H., SKUAST-K, Shalimar, Srinagar, Post Box NO-494, GPO Srinagar, 190 001

Corresponding Author: J.D. Parrah, Division of Veterinary Surgery and Radiology, F. V. Sc and A. H., SKUAST-K, Shalimar, Srinagar, Post Box NO-494, GPO Srinagar-190 001, Jammu and Kashmir, India.

Email: drjdparrah@gmail.com

How to cite this article: Firdous, W., Parrah, J.D., Bilal, S., Athar, H., Dar, M.D. and Handoo, N. (2021). Prospective Clinical Study on the Occurrence of Ovine Urolithiasis in Kashmir Valley of India. Indian Journal of Animal Research. DOI: 10.18805/IJAR.B-4202.

Submitted: 30-05-2020 **Accepted:** 24-12-2020 **Online:** 11-05-2021

MATERIALS AND METHODS

The study was conducted on clinical cases of male sheep suffering from complete retention of urine. All the sheep cases presented to Veterinary Clinical Complex Faculty of Veterinary Sciences and Animal Husbandry, Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir (SKUAST-K) during the period December 2014 to December 2015, were screened for their diseases and classified as medicinal, surgical and gynaecological ones. All the sheep surgical patients were subjected to complete

preoperative evaluation including clinical examination and the cases tentatively diagnosed as obstructive urolithiasis were recorded. The cases of retention of urine were confirmed on the basis of history provided by the owner, clinical examination, physical examination/abdominal palpation and abdominocentesis. The confirmed sheep patients suffering from complete retention of urine formed the material of the study. A complete history regarding the age, breed and sex of the animal, castration, duration of illness, mangemental practices, feeding habits of the animals, early signs of the disease, previous treatment, if any, were recorded. The data thus obtained was classified and subjected to statistical analysis as per the standard procedures (Snedecor and Cochran, 1976) and inferences drawn**.**

RESULTS AND DISCUSSION

No attempt has been made so far to record the hospital incidence of obstructive urolithiasis in sheep under temperate agro climatic conditions of Kashmir valley. The present study on occurrence of obstructive urolithiasis in sheep appears to be the Ist attempt made in this regard. During the period from December 2014 to December 2015, a total of 225 ovine surgical cases were brought to the Veterinary Clinical Complex, F.V. Sc. and A. H., SKUAST-K for the treatment. Of these cases, a total of 61 cases were diagnosed with obstructive urolithiasis disease, thereby giving an overall incidence of 27.11 %. All the cases were male rams with different age groups, weights and of different breeds. Clinical and ultrasonographic examinations were found sufficient to diagnose the cases of uolithiasis during this study, thus substantiating the findings of Riedi *et al*. (2018).The incidence is very high as compared to that of large ruminants which accounts for only 15.79 % (Parrah *et al.* 2011). Sheep usually don't receive individual attention; therefore there remains every chance of missing the diseased ones in big flocks. Moreover, there is a general notion among the local public and veterinarians that sick sheep is half dead. Sick sheep are usually disposed off in the local market without treating them. These conditions could be responsible for lower incidence of obstructive urolithiasis which otherwise would be very high.

Obstructive urolithiasis can occur in all the animals of every age and weight category and any sex. During the study, obstructive urolithiasis was observed only in intact male animals. The anatomical disposition of the male animals could be responsible for the uroliths lodgment and consequent development of obstructive urolithiasis. The lower urinary tract in male animals is long, tortuous and inflexible. Obstruction due to uroliths lodgment does not occur in females as their urethra is short with flexible lumen (Larson 1996; Radostitis *et al*. 2007). Castration affects the urethral development and testosterone production in the animals making the situation ideal for the uroliths lodgment. Reduction in the levels of testosterone decreases the hydrophilic colloids in the urine thus predisposing the animal to calculus formation (Williams, 1955). Reduction in urethral diameter induced by castration predisposes the animals for urethral obstruction (Larson, 1996). The disease is considered of high significance in fattening steers and in castrated lambs (Radostitis *et al.* 2007). Very surprisingly, no male sheep suffering from obstructive urolithiasis recorded during the study was castrated.

The incidence of obstructive urolithiasis has been reported to be influenced by the season and period of the year. The harsh winter of Kashmir valley called locally as *Chilia Kalaan* ranges from December 21st to ending February. This is a period when sheep and other animals develop uroliths because of excessive feeding of concentrates, lack of water and green fodders. The disease is then manifested mostly in the month of March. The results of the present study substantiate these view points as the highest number of the cases 27 (44.26 %) were presented during the month of March. (Table 1). Likewise, the highest (78.68 %) incidence of ovine obstructive urolithiasis was recorded during winter season (Table 2). The finding of the study is in total consonance with that of Amarpal *et al.* (2004), who also recorded higher incidence in ovine and caprine during extreme winter. Feeding of more concentrates, lower water consumption and deficiency of green fodder (vitamin A deficiency) are considered important contributing factors towards the development of disease (Parrah *et al*. 2011). During winter animals are totally confined in their sheds with total concentrate feeding, no provision of green fodder and non-availability of luke warm water ad lib. Feeding of concentrate induces antidiuretric hormone (ADH) release which causes a marked but transient decline in urine output and an increase in urine concentration (Bailey 1981; Hoffmeyer 1987). Concentrates are rich in phosphates content and may predispose the animals to urolithiasis (Hay, 1990; Larson 1996; Van metre 2004;). During summer, sheep are migrated to high land pastures for grazing green succulent forages. No concentrates are provided during this season. Water is provided *ad lib*. Chance of uroliths formation during these conditions becomes very remote. Even transportation of a sick sheep from these pastures is

Table 1: Month wise distribution of ovine obstructive urolithiasis Cases (n=61).

Month	Number of animals(n=61)	Percentage
December	04	6.55
January	07	11.47
February	10	16.39
March	27	44.26
April	09	14.71
November	04	6.55

Table 2: Season wise distribution of ovine obstructive urolithiasis Cases (n=61).

Season	N0. of animals	Percentage
Winter	48	78.68
Spring	09	14.75
Autumn	04	6.55

impracticable. These could be the reasons that not a single case of ovine obstructive urolithiasis was recorded during summer. The highest occurrence (31.14%) of the ovine obstructive urolithiasis cases was recorded in age group of 2 - 6 months and lowest in the age group of 26-30 months (3.27%) (Table 3). The incidence of the disease decreased with increase in the age of the lambs. It appears that the younger animals are unable to expel even the small calculi from the urethra ensuing in the urethral obstruction. The urethral diameter and strength of urethralis muscle are controlled by testosterone hormone, which is lower in the young males (Radostitis *et al*.2007). Findings of our study are also substantiated by the observations of Videra and van Amstel (2016), who reported that male small ruminants were commonly affected because of their particular anatomy, which includes long, narrow, tortuous urethra with a thin urethral process. Findings of this study are also in consonance with those of Mahajan *et al.* (2017), who also observed maximum number of cases in the age group of <6 months.

Cross Bred Kashmir Merino ovine were mostly affected, constituting (73.77%) followed by Cross Bred Corridale (18.03%) (Table 4). There appears no genetic predisposition to the formation of uroliths in animals. However, the Saanen breeds of sheep are reported to excrete high levels of phosphorus in urine thus making them apparently more susceptible to uroliths formation. The study area on and around VCC comprises the parts of district Ganderbal. As per the policy of Sheep Husbandry Department, J and K Government district Ganderbal has been exclusively earmarked for rearing of cross bred Kashmir Merino. The highest incidence of obstructive urolithiasis in this breed, thus commensurate with the highest population of the breed in that area. Perusal of the data again points towards another fact that cross bred animals are more affected with obstructive urolithiasis than local ones. This observation justifies the findings of the previous researchers; (Parrah *et al*. 2011), also recorded highest number of obstructive urolithiasis in cross bred calves than local ones in the same study area.

Highest number of ovine obstructive urolithiasis cases (60.65%) were brought for treatment at 48-96 hours after the onset of disease and lowest 4.91% at 96-120 hours (Table 5). Lack of definitive diagnostic facilities in the field like USG, vague symptoms exhibited by the urolithiasis cases, attempts to treat the cases with medicines at initial stages, non- availability of trained veterinarians to handle the cases and to give proper advice to the owners for referral of the cases to university clinics and other adjoining polyclinics and lack of transportation causes the delay in bringing the animals to the VCC for treatment. This is why the highest (60.65%) cases were brought to the clinics 48-96 hours after the onset of the disease. However, a good percentage of cases (21.31%) were brought to the clinics for treatment purposes during the initial stages of the disease (24-48 hours). The cases from far flung areas and hilly terrain were usually received as late as 120-144 hours of illness, when the cases were considered difficult to be treated locally. Contrast observations have been reported in other studies, where, maximum number of cases were presented in early phase of the disease (Tiruneh, 2000; Riedi *et al*. 2018).

At the time of admission, urinary bladder was found intact in majority of the cases 38 (62.29%) and ruptured only in 23 (37.70%) (Table 6). Complete obstruction to the urinary flow in the animals usually results in the rupture of either urinary bladder or urethra. During this study, no case with urethral rupture was recorded. Rupture in urinary

Table 3: Age wise distribution of ovine obstructive urolithiasis cases (n=61).

Age (Months)	No. of animals	Percentage
2-6	19	31.14
6-10	16	26.22
10-14	11	18.03
14-18	05	8.19
18-22	03	4.92
22-26	05	8.19
26-30	02	3.27

Table 4: Breed wise distribution of ovine obstructive urolithiasis Cases (n=61).

Breed	No. of animals	Percentage
Crossbred Kashmir Merino	45	73.77
Crossbred Corridale	11	18.03
Nondescript local	05	8.19

Table 5: Duration wise distribution of ovine obstructive urolithiasis cases (n=61).

Duration of illness (Hours)	No. of animals	Percentage
24-48	13	21.31
48-96	37	60.65
96-120	03	4.91
120-144	08	13.11

Table 6: Distribution of the obstructive urolithiasis cases according to their feeding schedule (N=24).

Schedule	Feeding combinations	No. of animals (n=24)	Percentage
1.	Rice bran + Maize fodder + Crushed maize	08	33.33
2.	Crushed Maize + Wheat bran	06	25.00
3.	Rice bran + Crushed maize + Sudan grass	04	16.6
4.	Wheat bran + Crushed Maize + Orchard grass	03	12. 5
5.	Wheat bran + Maize fodder + Rye grass	02	8.33
6.	Rice bran + Tree leaves	01	4.16
Total	24	100	

bladder was found in most of the cases 23 (37.7 %). Complete obstruction to the urine flow, delayed presentation of the cases for treatment and inadvertent administration of diuretics could be the cause of rupture of urinary bladder (Parrah *et al*. 2011).

A mixture of feeds and fodders were given to ovines depending upon the season and availability of feed and fodder (Table 6). Mixture of rice bran, maize fodder and crushed maize formed the feeding schedule 1, being provided to the highest number of cases and combination of rice bran and tree leaves formed schedule 6 being provided to the least number of animals. Several risk factors predispose the formation of uroliths in ruminants, chief among which diet plays a significant role (Jones *et al.* 2009), with concentrates reported to be always associated with urolithiasis (Mathews, 2009). Season, feed and water intake have direct relationship with one another. During summer, sheep are fed exclusively on grazing pastures with no provision of concentrates but plenty of water available to take *ad lib*. During harsh winter sheep are usually fed on concentrates with little forages and limited quantity of water. Feeding of concentrate instead of roughage diets results in reduction of water intake, reduced urine volume (Hay, 1990), induces ADH release causing decline urine output (Bailey, 1981; Hoffmeyer, 1987). Low water intake, both direct as well as indirect results in super saturation of urine. Low urine production allows the concentrated urine to stay longer in urinary bladder and thus provides time for the crystallization of minerals that otherwise could have been flushed out (Parrah *et al.* 2011).

CONCLUSION

From the present study it could be easily concluded that dietary management is of primary importance for prevention of the disease. Owners need to be apprised of the importance of balanced feeding *i.e.*, feeding of greens, fodder and concentrate in appropriate ratio besides keeping luke warm availability to the animals round the clock.

Authors' Contribution

WF and JDP planned and designed the study. All authors participated in data analysis, preparation of draft of the manuscript and read and approved the same.

ACKNOWLEDGEMENT

We thank Prof. H. U. Malik, Head Veterinary Clinical Services Complex (VCSC) and Prof. Sarfaraz Ahamed Wani Dean Faculty of Veterinary Sciences and Animal Husbandry (F. V. Sc. and A.H.), Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir (SKUAST-K) for granting the permission to conduct the work.

Competing Interests

The authors declare that they have no competing interest.

REFERENCES

Amarpal, Kinjavdekar, P., Aithal, H.P., Pawde, A.M., Tarunbir, S., Pratap, K. and Singh, T. (2004). Incidence of urolithiasis: a retrospective study of five years. Indian Journal of Animal Sciences. 74(2): 175-177.

Amarpal, Bishnoi, A.K., Sharma, S.N. and Singh, J. (2020). Urinary system. In: Ruminant Surgery: A textbook of the surgical diseases of cattle, buffaloes, camel, sheep and goats, CBS Publishers and Distributors, pp 378-395.

Bailey, C.B. (1981). Silica metabolism and silica urolithiasis in ruminants: a review. Canadian Journal of Animal Sciences. 61: 219-235.

Bani Ismail, B.Z.A., Al-Zghoul, M.F., Al-Majali, A.M. and Khraim, N.M. (2007). Effects of castration on penile and urethral development in Awassi lambs. Bulgarian Journal Veterinary Medicine. 10(1): 29-34.

Gasthuys, F., Steenhaut, M., Moor, A.D., Sercu, K. and De-Moor, A. (1993). Surgical treatment of urethral obstruction due to urolithiasis in male cattle: a review of 85 cases. Veterinary Record. 133(21): 522-526.

Hay, L. (1990). Prevention and treatment of urolithiasis in sheep. In Practice. 12: 87-89.

Hofmeyr, C.F.B. (1987). *Ruminant Urogenital Surgery*. Iowa State University Press pp 15-28.

Jones, M.L., Streeter, R.N. and Goad, C.L. (2009). Use of dietary cation anion difference for control of urolithiasis risk factors in goats. Animal Journal of Veterinary Research. 70: 149-155.

Larson, B.L. (1996). Identifying, treating and preventing bovine urolithiasis. Veterinary Medicine. 91: 366-377.

Mahajan, A., Gupt, A.K., Bhadwal, M.S., Bhat, M.A. and Bhardwaj, H.R. (2017). Occurrence and Management of obstructive urolthiasis in ruminants. Journal of Animal Research. 7(4): 723-731.

Matthews, J. (1999). Diseases of the Goat. Blackwell Science Inc. Malden, MA.

Onmaz, A.C., Albasan, H., Lulich, J.P., Osborne, C.A., Gunes, V. and Sancak, A.A. (2012). Mineral composition of uroliths in cattle in the region of kayseri. Ifac Veterinary Medicine Universities. 9: 175-181.

Parrah, J.D., Moulvi, B. A., Hussain, S.S. and Sheik, G.M. (2010). Occurrence of obstructive urolithiasis in cattle of Kashmir. SKUAST Journal of Research. 12: 193-199.

Parrah, J.D., Moulvi, B.A., Hussain, S.S., Bilal, S. and Ridwana. (2011). Innovative tube cystostomy for the management of bovine clinical cases of obstructive urolithiasis. Veterinarski Arhiv. 81: 321-337.

Radostits, O.M., Gay, C.C., Hinchcliff, K.W. and Constable, P.D. (2007). Diseases of the urinary system. In: Veterinary Medicine: A textbook of the diseases of cattle, horses, sheep, pigs and goats, 10th ed. Saunders-Elsevier, Pennysylvania, pp. 543-571

Riedi, A-K., Knubben-Schweizer, G and Meylan, M. (2018). Clinical findings and diagnostic procedures in 270 small ruminants with obstructive urolithiasis. Journal of Veterinary Internal Medicine 32: 1274-1282.

Singh, S., Gera, K.L. and Nigam, J.M. (1981). Hematological and biochemical studying obstructive urolithiasis in bovine. Indian Journal of Veterinary Surgery. 2: 72-79.

Snedecor, G.W. and Cochran, W.G. (1976). Statistical Methods. Iowa State University Press. pp 20-28, 58-59.

Sonawane, G.G., Dubey, S.C. and Koli, O.P. (2007). Obstructive urolithiasis in a flock of male weaner sheep at an organised farm in semiarid Rajasthan. Indian Journal of Veterinary Pathology 31(2): 126:129.

Tiruneh, R. (2000). A retrospective study on ruminant urethral obstruction in DebreZeit area, Ethiopia. Revue-de-Medecine-Veterinaire 151(8-9): 855-860.

Van-Metre, D. (2004). Urolithiasis. Farm Animal Surgery, Eds Susan L. Fubini and Norm G. Ducharme, W.B. Saunders, New York pp. 534-547.

Videla R and van Amstel S. (2016). Urolithiasis. Veterinary Clinics of North America-Food Animal Practice. 32: 687-700.

VinodhKumar, O.R., Swarnkar, C.P., Shinde, A.K. and Singh, D. (2010). Clinical, mineral and haemato biochemical studies of urolithiasis in weaner lambs. African Journal of Agricultural Research. 5(15): 2045-2050.

Williams, L.F. (1955). Veterinary Medicine. 50: 51 (Cited by Bhatt *et al.*, 1973).