

Case Report

Significance of Presence of Uric Acid Crystals in Seminal Fluid in a Patient with History of Infertility: A Case Report with Review of Literature

Nilam Bhasker¹

¹Consultant Pathologist, Lucknow, India

ABSTRACT:

Presence of uric acid crystals in semen is not a uncommon finding. Several underlying causes have been explained over the years in the literature. Majority of the studied were focussed on the establishment of correlation in between these crystals and sperm parameters. Usually, these crystals are presented in semen asymptotically however; rarely they can be painful when contaminated with superadded microbial colonies. Till date very few case reports have been presented by researchers worldwide. This paper is focussed on the Significance of presence of uric acid crystals in seminal fluid in a patient with history of infertility. Author has also reviewed several critical studies and their implications in these regards.

Key words: Uric Acid Crystals, Infertility, Semen, Spermatozoa

Received: Sep 23, 2020

Accepted: Oct 17, 2020

Corresponding Author: Dr. Nilam Bhasker, Consultant Pathologist, Nidan Diagnostic Centre, Lucknow, India

This article may be cited as: Bhasker N. Significance of presence of uric acid crystals in seminal fluid in a patient with history of infertility: A case report with review of literature. *Int J Res Health Allied Sci* 2020;6(6):85-87.

INTRODUCTION

The presence of organic and inorganic crystals in urine is a usual finding. However, the presence of crystals in semen is unusual. Many of the pioneer workers including Lobel et al showed that uric acid excretion is one of the possible aetiology for Chronic prostatitis.^{1,2} Presence of uric acid crystals in semen have been shown to alter many morphological and physiological characteristics of sperms including their motility, membrane integrity, semen concentration, DNA level changes and seminal pH.³ There are several schools of thoughts about correlation of uric acid crystals and infertility. However; mostly these crystals have been shown to clinically alter the fertility.^{4,5} Furthermore, there is clear deficiency of clinical trials and long term studies in these regards. This paper is an attempt to justify all the aspects of uric acid crystals in semen by a comprehensive review of literature. Author also presented a case report on the Significance of presence of uric acid crystals in seminal fluid in a patient with history of infertility.

CASE REPORT

A specimen of seminal fluid was received as a routine seminal fluid analysis. A 35 year old patient presented with history of infertility even after marriage of 10 years. The patient did not have a history of urological or surgical manipulation and was not receiving any medication or vitamins, and the physical examination was normal. Relative significance was explained to the patients before the real execution of study. Written informed consent was obtained from the patient. Approximate 2 ml of Sample was received in private diagnostic centre in Lucknow. The colour of the semen was slightly brown at the time of sample collection. All the physical findings were normal including-pH, viscosity, liquefaction time-30 minutes, and chemical finding includes Fructose test. Microscopic findings were normal including- sperm count, motility and morphology. Study of chemical and morphological characteristics of uric acid crystals found in the semen was done using standard semen analysis. Author noticed total absence of considerable bacterial growth and leukocyte counts. Owing to

sample's slight brown colour, Red blood cells were not found under direct microscopy. Additional finding was identify that there was many uric acid crystals along with spermatozoa (Figure 1). Therefore, author confirmed that the reddish appearance of the semen was due to the abundant quantity of these slightly brownish crystals. Patient has been advised to be on low purine diet to relieve the symptoms.

Figure 1: Photomicrograph (40X) showing Uric acid crystals with spermatozoa in seminal fluid in unstained wet smear



REVIEW OF LITERATURE

Now it is an established fact that the appearance of uric acid crystals is strictly pH dependant. Author confirmed that these crystals could have originated from the prostate under the influence of a urinary reflux to this organ where it mixes with the acidic fluids, and trigger formation of the crystals. Literature have well demonstrated the role of uric acid (2,6,8-trihydroxypurine), an end product of adenosine and guanosine catabolism, on semen quality and sperm function. Motrich et al demonstrated that the appearance of uric acid crystals is strictly pH dependant. It is possible that these crystals could have originated from the prostate under the influence of an urinary reflux to this organ where it mixes with the acidic fluids, and trigger formation of the crystals.⁶ Almost all main sperm parameters such as motility, count, morphology, and DNA damage are significantly affected by seminal uric acid, showing improved sperm parameters at normal and even at higher seminal uric acid concentrations. In contrast, uric acid crystals were detected in semen of a patient with symptoms of chronic prostatitis, and these crystals could be behind the observed sperm abnormalities. Kim and associates studied the Effects of nitrogenous components of urine on sperm motility. It was an in vitro study on human sperms in which they found that sperm motility increases with presence of uric acid crystals.⁷ Hughes and coworkers studied those uric acid crystals at 400 μ M and their effects on sperm activity. They stated that Uric acid crystals of 400 μ M size usually induce sperm DNA

damage. Therefore it is a causative factor for human infertility.⁸ Zhang and researchers have noticed that clinical presence of uric acid crystals in semen increases sperm motility and growth. However, relative sperm concentration, semen pH and semen volume was showing variable patterns.⁹ Lahnsteiner et al in an in vitro evaluation, studied uric acid crystals (0.25,0.5/5–7 $\times 10^7$ cells mL⁻¹) in Brown trout semen. They showed increased Sperm membrane integrity and Sperm motility. These crystals were also noticed to decrease Sperm lipid peroxidation.¹⁰ Zhang HY and colleagues showed that effects of seminal uric acid in sub fertile men. They confirmed that these crystals significantly reduces semen volume, sperm count and sperm motility. However, these inferences may not be exactly correlated with our case based on the differences in geographical areas.¹¹ Kutluyer and other researchers have shown clinical effects on presence of uric acid in semen at 0.25 mmol L⁻¹. They clearly stated that such crystals drastically increase the sperm motility. Inferences were not in accordance with our results and could be explained on the basis of difference in studied population and race. However; they have also studied the changes happened at sperm's morphological level. This could be one of the reasons of their popularity and acceptance worldwide.¹² Srivastava and associates confirmed that presence of uric acid crystals in seminal fluid generally increases sperm concentration and membrane integrity. Their study results were in accordance with our inferences.¹³ Banihani demonstrated that uric acid enhances few bioactive enzymes that are vital for sperm function. They also confirmed that high levels of uric acid in semen may induce adverse effects to sperm function, this may occur by the reduction of the activity of vital seminal enzymes.¹⁴ Umekawa et al. demonstrated an increased expression of monocyte chemo attractant protein by epithelial cells in culture with exposure to uric acid crystals.¹⁵

CONCLUSION

Uric acid crystal is not very common finding in semen as it is not identified in every or alternative specimens. Microscopic confirmation of uric acid crystals in semen can assist clinicians in accurate diagnosis and treatment planning. Author also stated that it does not directly affect sperm motility. Furthermore; it is still unidentified whether the existences of uric acid crystals in semen are the sign of a future disease of surrounding tissues and organs. Therefore, in presence of uric acid crystals in semen author suggest all the related investigations to be done so as to formulate accurate treatment planning for patient.

REFERENCES

1. Lobel B, Rodriguez A. Chronic prostatitis: what we know, what we do not know, and what we should do! World J Urol. 2003;21:57–63.

2. Bjerklund Johansen TE, Weidner W. Understanding chronic pelvic pain syndrome. *Curr Opin Urol.* 2002;12:63–7.
3. Karlovsky ME, Pontari MA. Theories of prostatitis etiology. *Curr Urol Rep.* 2002;3:307–12.
4. Krieger JN, Nyberg L Jr, Nickel JC. NIH consensus, definition and classification of prostatitis. *JAMA* 1999;282:236–7.
5. Persson BE, Ronquist G. Evidence for a mechanistic association between nonbacterial prostatitis and levels of urate and creatinine in expressed prostatic secretion. *J Urol* 1996;155:958–60.
6. Motrich et al. Uric acid crystals in semen. *Fertility and Sterility* 2006;85(3):751-54.
7. Kim, SC, Kim HW. Effects of nitrogenous components of urine on sperm motility: An in vitro study. *Int J Androl.*1998;21:29–33.
8. Hughes CM, Lewis SE, McKelvey-Martin VJ, Thompson W. The effects of antioxidant supplementation during Percoll preparation on human sperm DNA integrity. *Hum Reprod* 1998;13:1240–7.
9. Zhang HY, Lu JC, Zhang RS, Xia YX, Huang YF. Determination of uric acid in seminal plasma and correlation between seminal uric acid and semen parameters. *Zhonghua Nan Ke Xue* 2007;13:1016–9.
10. Lahnsteiner F, Mansour N, Plaetzer K. Antioxidant systems of brown trout (*Salmo trutta f. fario*) semen. *Anim. Reprod. Sci.*2010;119:314–21.
11. Zhang HY, Lu JC, Feng RX. Correlations of 24 biochemical markers in seminal plasma with routine semen parameters. *Zhonghua Nan Ke Xue* 2015;21:1087–109.
12. Kutluyer F, Kayim M, Ogretmen F, Buyukleblebici S, Tuncer PB. Cryopreservation of rainbow trout *Oncorhynchus mykiss* spermatozoa: Effects of extender supplemented with different antioxidants on sperm motility, velocity and fertility. *Cryobiology* 2014;69:462–6.
13. Srivastava A, Chopra SK, Dasgupta PR. Biochemical analysis of human seminal plasma. II. Protein, non-protein nitrogen, urea, uric acid and creatine. *Andrologia* 1984;16:265–8.
14. Banihani SA. Role of Uric Acid in Semen. *Biomolecules* 2018;8:65:2-8.
15. Umekawa T, Chegini N, Khan SR. Increased expression of monocyte chemoattractant protein-1 (MCP-1) by renal epithelial cells in culture on exposure to calcium oxalate, phosphate and uric acid crystals. *Nephrol Dial Transplant* 2003;18:664–9.