Journal of Advanced Medical and Dental Sciences Research

@Society of Scientific Research and Studies

Journal home page: www.jamdsr.com doi: 10.21276/jamdsr

(e) ISSN Online: 2321-9599; (p) ISSN Print: 2348-6805

Original Research

Uric acid a predictor of sepsis in critically ill patients

Arshied Hussain Bhat

MD Medicine
Registrar, GMC Srinagar, Jammu and Kashmir, India

ABSTRACT

Background: It was shown that serum uric acid level was changed in more severe sepsis patients. The present study was conducted to evaluate level of uric acid in sepsis patients. **Materials & Methods:** The present study was conducted on 137 patients of sepsis of both genders. Sepsis was defined based on the Society of Critical Care Medicine, Surviving Sepsis Campaign 2012 definition. Patients underwent uric acid, basic metabolic profile, complete blood count, lactic acid, phosphorus, albumin and arterial blood gas assessment. We assessed hyperurecemia in patients presenting with sepsis and the morbidity rate. **Results:** Out of 137 patients, males were 71 and females were 66. 36 patients of diabetes had high uric acid, 16 had CAD, 21 had CVA, 10 had CHF and 7 had pulmonary disease. 28 had BMI >30, 23 had between 25-29.9 and 39 had 18.5- 24.9. The difference was significant (P<0.05). Out of 137 patients, 102 patients died and out of which 87 had high uric acid level. The difference between survived and died patients was significant (P< 0.05).**Conclusion:** Authors found that hyperurecemia was a predictor of sepsis in patients.

Key words: Critical Care Medicine, hyperurecemia, sepsis.

Corresponding author: Dr. Arshied Hussain Bhat, MD Medicine, Registrar, GMC Srinagar, Jammu and Kashmir, India

This article may be cited as: Bhat AH. Uric acid a predictor of sepsis in critically ill patients. J Adv Med Dent Scie Res 2018;6(1):158-161.

Introduction

Uric acid is the final oxidative product of purine metabolism through the action of xanthine oxidase or xanthine dehydrogenase. Approximately two-thirds of uric acid is excreted by the kidney, and the rest is excreted by the gastrointestinal tract. In addition some uric acid is degraded in the body after reaction with oxidants or peroxynitrite.[1]

Uric acid is an end product of purine base metabolism and an antioxidant agent. Serum uric acid concentration is influenced by several factors such as overproduction, decreased glomerular filtration or renal hypoperfusion, enhanced tubular reabsorption or diminished elimination.[2] It was shown that serum uric acid level was changed in more severe sepsis patients. The role of uric acid as an independent causative or potential risk factor of mortality is controversial in patients with kidney disease, hypertension, obesity, cardiovascular events, diabetes mellitus, ischemic stroke and cancer disease. There has been found a correlation between serum uric acid level and inflammatory markers on population based cohort studies.[3]

Sepsis is a serious medical condition characterized by a whole-body inflammatory state (systemic inflammatory response syndrome) and the presence of a known or suspected infection that has severe consequences. Hence majority of intensive care unit patients undergo ischemic reperfusion injury and inflammation to varying degrees during their hospitalization. Uric acid may be a factor playing a role in these processes since it has both oxidant and antioxidant properties. Since high levels of oxyradicals and lower antioxidant levels in patients with sepsis are believed to result in multiorgan failure, the measurement of uric acid levels could be possibly used as a marker of oxidative stress in patients with sepsis.[4] The present study was conducted to evaluate level of uric acid in sepsis patients.

Materials & Methods

The present study was conducted in the department of Internal Medicine. It comprised of 137 patients of sepsis of both genders. Ethical clearance was taken from institutional ethical committee. Written consent was obtained from patients.

General information such as name, age, sex etc. was recorded. Sepsis was defined based on the Society of Critical Care Medicine, Surviving Sepsis Campaign 2012 definition. In all patients, thorough clinical examination was done. Patients underwent uric acid, basic metabolic profile, complete blood count, lactic acid, phosphorus, albumin and arterial blood gas assessment. We assessed hyperuricemia in patients presenting with sepsis and the morbidity rate. Results thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

Results

Table I Distribution of patients

Total- 137		
Gender	**Males**	**Females**
Number	71	66

Table I, graph I shows that out of 137 patients, males were 71 and females were 66.

Graph I Distribution of patients

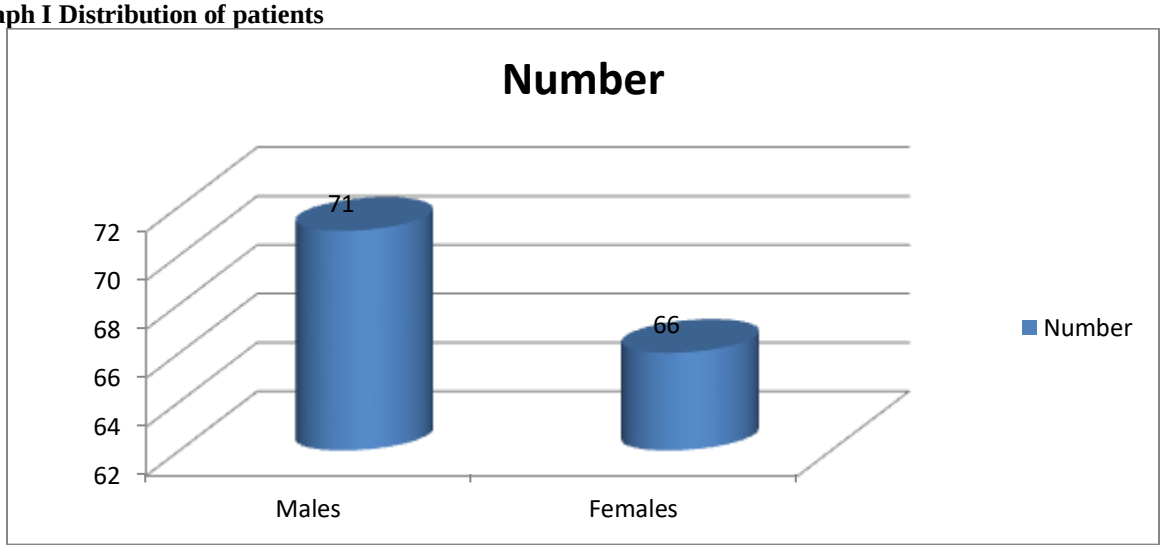

Table II Baseline characteristics

Characteristics	Number	High Uric acid	Low Uric acid	P value
DM	54	36	18	0.02
CAD	26	16	10	0.01
CVA	32	21	11	0.01
CHF	15	10	5	0.02
Pulmonary disease	10	7	3	0.05
BMI 18.5- 24.9	56	39	17	0.01
25-29.9	32	23	9	0.01
>30	44	28	16	0.05

Table II, graph II shows that 36 patients of diabetes had high uric acid, 16 had CAD, 21 had CVA, 10 had CHF and 7 had pulmonary disease. 28 had BMI >30, 23 had between 25-29.9 and 39 had 18.5- 24.9. The difference was significant (P<0.05).

Graph II Baseline characteristics

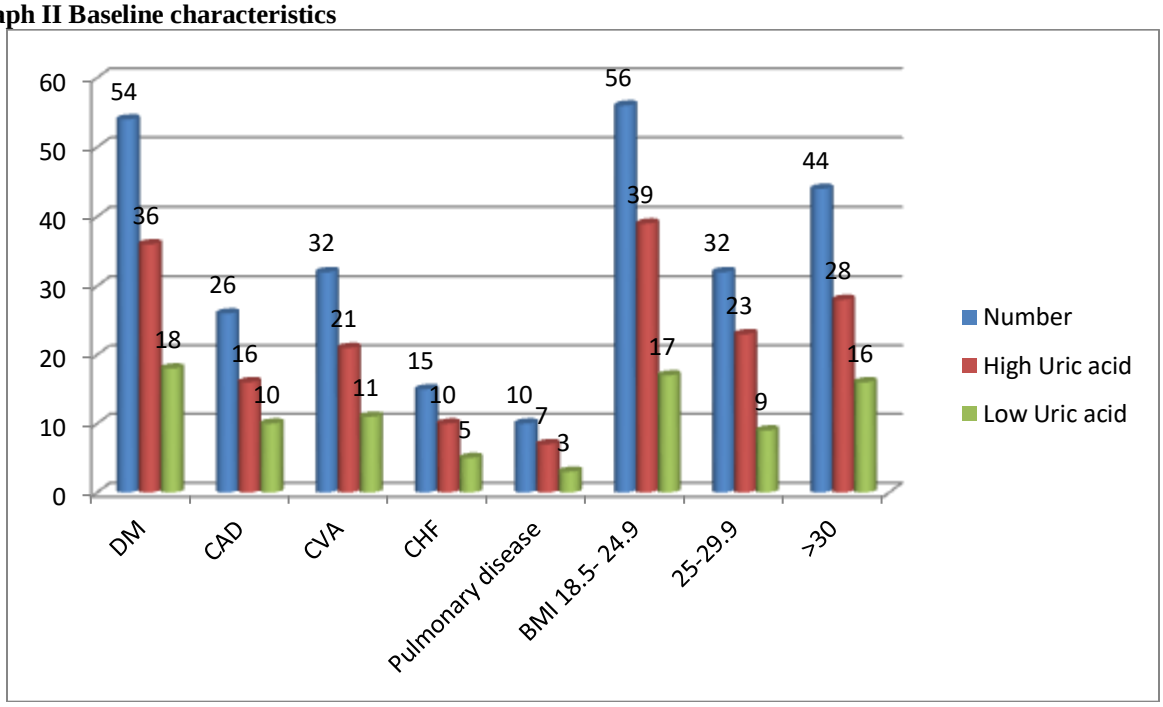

Table III Morbidity rate

Morbidity rate	Number	High Uric acid	Low Uric acid	P value
Survived	35	12	21	0.05
Died	102	87	15	0.01

Table III shows that out of 137 patients, 102 patients died and out of which 87 had high uric acid level. The difference between survived and died patients was significant (P< 0.05).

Discussion

Hyperuricemia is generally defined by UA levels >6.5 mg/dl or 7 mg/dl in men and >6 mg/dl in women. The role of UA as an independent causative or potential risk factor of mortality is controversial in patients with kidney disease, hypertension, obesity, cardiovascular events, diabetes mellitus, ischemic stroke, and cancer disease.[5] It was shown that serum UA level changed in patients with more severe sepsis. These data show the combined effect of several factors on UA.[6] The changes in UA in the clinical setting and pathophysiological events are related to oxidative stress, and provide evidence of impaired plasma antioxidant capacity in severe sepsis. A correlation has been found between serum UA level and inflammatory markers on population-based cohort studies. Serum UA concentrations can be considered as a marker of severity in critically ill patients without craniocerebral trauma and especially in patients with meningococcal infection.[7] Changes in hypoxanthine, xanthine, UA concentrations, and oxygen transport parameters can be used to assess changes in the functioning of the microcirculatory bed. It has been established that an increased blood plasma level of hypoxanthine and xanthine may serve as an additional criterion of tissue hypoxia in critically ill surgical patients.[8] The present study was conducted to evaluate level of uric acid in sepsis patients.

In this study, out of 137 patients, males were 71 and females were 66. Hooman et al[9] in their study divided patients into two groups: Patients with serum UA level lower than 7.3 mg/dl and patients with serum UA level of equal or more than 7.3 mg/dl. In patients, who needed mechanical ventilation, average of serum UA was 7.82 ± 2.82; however, in the patients who did not need mechanical ventilation this amount was 6.16 ± 2.7, a difference was statically significant. We found a statically meaningful difference between serum UA level with requiring mechanical ventilation and the predictive level of UA. In the evaluation of MEDS, most patients with serum UA levels lower than 7.3 mg/dl had lower MEDS points (on average 4.6 ± 3.21) in compared to patients with serum UA level higher than 7.3 mg/dl (on average 12 ± 2.99). This difference was found to be statistically significant which indicates the patients whose serum UA was 7.3 mg/dl or higher, were at higher risk of mortality.

We found that 36 patients of diabetes had high uric acid, 16 had CAD, 21 had CVA, 10 had CHF and 7 had pulmonary disease. 28 had BMI >30, 23 had between 25-29.9 and 39 had 18.5- 24.9. out of 137 patients, 102 patients died and out of which 87 had high uric acid level. Akbar et al[10] conducted a prospective cohort study and hypothesized that elevated uric acid in patients with sepsis is predictive of greater morbidity. The primary end point was the correlation between hyperuricemia and the morbidity rate. Secondary end points were Acute Kidney Injury (AKI), mortality, Acute Respiratory Distress Syndrome (ARDS), and duration of stay. Out of 144 patients, 54 (37.5%) had the primary end point of hyperuricemia. The overall morbidity rate was 85.2%. The probability of having hyperuricemia along with AKI was 68.5% and without AKI was 31.5%. Meanwhile the probability of having a uric acid value <7mg/dL along with AKI was 18.9% and without AKI was 81.1%.

Conclusion

Authors found that hyperurecemia was a predictor of sepsis in patients.

References

1. Jacobs S, Zuleika M, Tariq M. Calculated total radical antioxidant potential compared in outcome groups of septic shock. Clin Intensive Care. 1999;10(1):7-12.
2. Chuang CC, Shiesh SC, Chi CH, et al. Serum total antioxidant capacity reflects severity of illness in patients with severe sepsis. Crit Care. 2006; 10(1):R36.
3. MacKinnon KL, Molnar Z, Lowe D, et al. Measures of total free radical activity in critically ill patients. Clin Biochem 1999;32(4): 263-8.
4. Pascual C, Karzai W, Meier-Hellmann A, et al. Total plasma antioxidant capacity is not always decreased in sepsis. Crit Care Med. 1998;26(4): 705-9.
5. Jee SH, Lee SY, Kim MT. Serum uric acid and risk of death from cancer, cardiovascular disease or all causes in men. Eur J Cardiovasc Prev Rehabil. 2004;11(3):185-91.
6. Bos MJ, Koudstaal PJ, Hofman A, et al. Uric acid is a risk factor for myocardial infarction and stroke: the Rotterdam study. Stroke 2006; 37(6):1503-7.
7. Shin HS, Lee HR, Lee DC, et al. Uric acid as a prognostic factor for survival time: a prospective cohort study of terminally ill cancer patients. J Pain Symptom Manage 2006;31(6): 493-501.
8. Weir CJ, Muir SW, Walters MR, et al. Serum urate as an independent predictor of poor outcome and future vascular events after acute stroke. Stroke 2003;34(8):1951-6.
9. Hooman N, Mehrazma M, Nakhaii S, Otukesh H, Moradi-Lakeh M, Dianati-Maleki N, Ehteshami-Afshar A. The value of serum uric acid as a mortality prediction in critically ill children. Iranian journal of pediatrics. 2010 Sep;20(3):323.
10. Akbar SR, Long DM, Hussain K, Alhajhusain A, Ahmed US, Iqbal HI, Ali AW, Leonard R, Dalton C. Hyperuricemia: an early marker for severity of illness in sepsis. International journal of nephrology. 2015;2015.