Open Access

Original Article

Acute Ischemic Stroke

Pak Armed Forces Med J 2021; 71 (3): 1024-26

FREQUENCY OF HYPERURICEMIA IN PATIENTS OF ACUTE ISCHEMIC STROKE

Qaisar Iqbal, Sarfaraz Ahmad, Naveed Lashari*, Muhammad Arif Khan

PAF Hospital Mushaf Sargodha, Pakistan, * PAF Hospital Mushaf Lahore, Pakistan

ABSTRACT

Objective: To determine the frequency of hyperuricemia in acute ischemic stroke.
Study Design: Cross sectional study.
Place and Duration of Study: Medical Unit, Pakistan Air Forces Hospital, Mushaf Sargodha, from Aug 2015 to Jan 2016.
Methodology: A total of 125 patients were included in this study that fulfils the inclusion criteria, ischemic stroke on CT scan brain plain (hypo dense area) presented to hospital within 24 hours. Patients with transient ischemic attack (TIA), subarachnoid hemorrhage (SAH), intracerebral hemorrhage (ICH), space occupying lesion (SOL) on neuroimaging (CT scan) and with diagnosed Autoimmune or connective tissue disorders were excluded. Acute ischemic stroke was confirmed by neuroimaging (CT scan brain non contrast) reported by consultant Radiologist (FCPS Radiology) and uric acid level was measured within hospital lab with photometry using the diagnostic kit for quantification of uric acid prepared by (Pars Azmoon Company) and was verified by consultant pathologist. All information and reports were collected on proforma.
Results: Age range in this study was from 30-90 years with mean age 60.832 ± 12.01 years and mean uric acid level was 5.773 ± 1.95 mg/dl. Majority of the patients were male (86.4%). Hyperuricemia was seen in 40 (32%) patients.
Conclusion: Prevalence of hyperuricemia in patients with acute stroke is significantly higher than normal population.

Keywords: Frequency, Hyperuricemia, Ischemic, Stroke.

INTRODUCTION

Stroke is the third basic cause of death in elderly after CHD. The mortality of stroke is high, 20% in acute stage and it stays higher for quite a long time[1]. Stroke is second cause of disability like handicap and dementia in age group >65 years and in >20% dementia appear after stroke[2]. Forty percent of survivors do not fully recover from stroke related disabilities and 25% remain unable to walk freely on their own. Hyperuricemia refers to an elevation in the serum uric acid concentration. Uric acid (UA) is the end product of purine metabolism in humans. Uric acid is synthesized mainly in the liver, intestines and other tissues such as muscles, kidneys and the vascular endothelium as the end product of an exogenous pool of purines, derived largely from animal proteins. The progressive increase in serum uric acid level may be linked to the rising prevalence of overweight and obesity, as well as the increase in consumption of sugar-sweetened beverages and foods rich in purines. Kidneys are responsible for its clearance from body. Uric acid level is affected by age and sex. Preceding adolescence, the normal serum uric acid level is 3.6 mg/dl for males and females. A high serum uric acid level is associated with greater risk of cardiovascular events, raised serum triglyceride, cholesterol, hypertension, overweight, insulin resistance and metabolic disorders. Hyperuricemia has now been identified as a marker for a number of metabolic and hemodynamic abnormalities[3]. The high level of urate is linked ischemic stroke. High serum urate level cause poor outcome (dead or in care) and higher vascular event rate in stroke patients[4]. In contrast a study showeddecreased uric acid levels correlate with poor outcomes in acute ischemic stroke patients, suggesting that serum urate might be advantageous and secure against poor outcomes[5]. Another exploratory review suggested that higher uric acid level after thromboembolic stroke is neuroprotective[6]. A study by Mangal AC, Guria RT, Singh MK in Institute of Medical Sciences, Ranchi shows 29% prevalence of Hyperuricemia in acute ischemic stroke patients[7]. Mehrpour *et al* study showed 47.3% prevalence of hyperuricemia in acute ischemic stroke patients[8].

After analyzing above studies, data shows striking variation in incidence of hyperuricemia in patient of ischemic stroke. There is no such study done in Pakistan. This study is being carried out to appraise the frequency of Hyperuricemia in patient of ischemic stroke in our region and will ultimately contribute to better understanding of disease and its prognostic factors. Aim of this study is to determine the frequency of hyperuricemia in acute ischemic stroke.

METHODOLOGY

This cross sectional study was conducted in indoor Medical Unit, PAF Hospital Mushaf Sargodha,

Correspondence: Dr Qaisar Iqbal, Medical Specialist, PAF Hospital Mushaf Sarghoda Pakistan
Received: 20 Dec 2018; revised received: 16 Jun 2019; accepted: 24 Jun 2019

from August 2015 to January 2016. With the help of WHO sample size calculator, 125 patients were included, who fulfil the inclusion criteria i.e. Ischemic stroke on CT scan brain plain (hypo dense area) presented to hospital within 24 hours of ischemic stroke, with confidence level of 95%, anticipated population proportion 29% and absolute precision required 8%. Patients with Transient ischemic attack (TIA), subarachnoid hemorrhage (SAH), Intracerebral hemorrhage (ICH), space occupying lesion (SOL) on neuroimaging (CT scan) and with diagnosed Autoimmune or connective tissue disorders were excluded. Acute ischemic stroke was confirmed by neuroimaging (CT scan brain non contrast) reported by consultant radiologist (FCPS Radiology) and Uric acid level was measured within hospital laboratory with photometry using the diagnostic kit for quantification of uric acid prepared by (Pars Azmoon Company) and was verified by consultant pathologist. All information and reports were collected on proforma. Data were entered and analyzed by using statistical package SPSS-16. Descriptive statistics was used to analyze qualitative and qua-ntitative variables. In qualitative variable like gender and hyperuricemia, frequency and percentage were calculated. In quantitative variable like age and uric acid level, mean ± SD were calculated.

RESULTS

Age range in this study was from 30-90 years with mean age 60.832 ± 12.01 years and mean uric acid level was 5.773 ± 1.95 mg/dl. There were 108 (86.4%) male and 17 (13.6%) female. Hyperuricemia was seen in 40 (32%) patients.

DISCUSSION

In this study we determined the role of serum uric acid in acute stroke and its prognostic significance on stroke outcome. Mean serum uric acid level was 5.773 ± 1.95 mg/dl. Hyperuricemia was seen in 40 (32%) patients. According to a study, the prevalence of high uric acid level in United State is 20.1%[9]. A study of Bangkok papulation indicates that prevalence of high uric acid level is 24.4%[10] and another study reported the prevalence of hyperuricemia is 32.7%[11]. According to above mentioned studies prevalence of high uric acid level is significantly higher in patients with acute stroke as compared to normal population. Stroke is one of the principle clinical manifestations of cerebrovascular disease and studies researching the connection between the uric acid and stroke have been disconsonant. A few studies display a positive independent relationship between uric acid and stroke though others showed that uric acid did not relate to stroke event[12]. Tushar *et al* in his study found serum uric acid level is significantly high in patients of ischemic stroke and uric acid level can be used as a marker for increased risk of stroke[13]. Kim *et al* study of 16 prospective cohort studies consist of more than two hundred thousand patients find the relation between high uric acid level and risk of stroke. They found that high uric acid level may simply increase the risk of both stroke and its mortality[14]. Hyperuricemia has also been found to predict poor outcome in cardio embolic stroke (CES)[15]. In Kanbay *et al* study shows thaturic acid is biologically active and can stimulate oxidative stress, endothelial dysfunction, inflammation and vasoconstriction[16]. On the other hand, Wang and friends analyzed the outcomes of 1166 patients with ischemic stroke and concluded that high uric acid level has significant protective effect on neurological outcome[17]. Miedema *et al* also reported that there was no association between SUA levels and prognostic outcome in acute ischemic stroke[18]. Moreover A study in Iran also show similar result of no association between ischemic stroke and uric acid level[19]. Several studies that investigated the effect of SUA levels at the onset on the prognostic

Table: Hyperuricemia with respect to age, gender, diabetes mellitus, hypertension, smoking, family history of stroke and hypertriglyceridemia.

Variables	n (%)	Hyperuricemia		*p*-value
		Present n (%)	Absent n (%)	
Age (Years)				
30-50	25 (20)	8 (32)	17 (68)	0.882
51-70	69 (55.2)	21 (30.4)	48 (69.6)	
71-90	31 (24.8)	11 (35.5)	20 (64.5)	
Gender				
Male	108 (86.4)	34 (31.5)	74 (68.5)	0.754
Female	17 (13.6)	6 (35.3)	11 (64.7)	
Diabetes Mellitus				
Yes	31 (24.8)	27 (87.1)	4 (12.9)	0.001
No	94 (75.2)	13 (13.8)	81 (86.2)	
Hypertension				
Yes	28 (22.4)	14 (50)	14 (50)	0.020
No	97 (77.6)	26 (26.8)	71 (73.2)	
Smoking				
Yes	35 (28)	7 (20)	28 (80)	0.073
No	90 (72)	33 (36.7)	57 (63.3)	
Family History of Stroke				
Yes	25 (20)	6 (24)	19 (76)	0.338
No	100 (80)	34 (34)	66 (66)	
Triglyceridemia				
Yes	34 (27.2)	6 (17.6)	28 (82.4)	0.035
No	91 (72.8)	34 (37.4)	57 (62.6)	

outcome of ischemic stroke showed neuroprotective benefit for preventing neurological injury and the study suggest that intravenous administration of exogenous UA improves the clinical outcome in patients with acute ischemic stroke[20]. Recently, Chen *et al* concentrated 226 hemodialysis patients and followed them for year and a half, 43 patients experienced acute ischemic stroke; serum uric acid is contrarily identified with acute ischemic stroke in hemodialysis patients[21].

CONCLUSION

Prevalence of hyperuricemia in patients with acute stroke is significantly higher than normal population.

CONFLICT OF INTEREST

This study has no conflict of interest to be declared by any author.

REFERENCES

1. Cuadrado-Godia E, Ois A, Roquer J. Heart failure in acute ischemic stroke. Curr Cardiol Rev 2010; 63(3): 202–13.
2. Feigin VL, Forouzanfar MH, Krishnamurthi R. Global and regional burden of stroke during 1990–2010: findings from the global burden of disease study 2010. Lancet 2014; 383(9913): 245–54.
3. Stack A, Manolis AJ, Ritz E. Detrimental role of hyperuricemia on the cardio-reno-vascular system. Curr Med Res Opin 2015; (Suppl-2): 21-26.
4. Falsetti L, Capeci W, Tarquinio N, Viticchi G, Silvestrini M, Catozzo V, et al. Serum uric acid, kidney function and acute ischemic stroke outcomes in elderly patients: a single-cohort, perspective study. Neurol Int 2017; 9(1): 6920.
5. Wu H, Jia Q, Liu G. Decreased uric acid levels correlate with poor outcomes in acute ischemic stroke patients, but not in cerebral hemorrhage patients. Stroke 2011; 42 (Suppl-1): S28-32.
6. Amaro, S, Urra, X, Gómez-Choco M. Uric acid levels are relevant in patients with stroke treated with thrombolysis. Stroke 2011; 42(Suppl-1): S28-32.
7. Arvind CM, Rishi TG, Manish KS. Serum uric acid level in acute ischemic stroke. J Evol Med Dent Sci 2013; 2(36); 6915-26.
8. Masoud M, Mahbubeh K, Neda N, Mohamad RM, Seyed MF. Serum uric acid level in acute stroke patients. Med J Islam Repub Iran2012; 26(2): 66-72.
9. Yanyan Z, Bhavik P, Hyon C. Prevalence of hyperuricemia in the us general population: the national health and nutrition examination survey (NHANES) 1999-2008. Arthritis Rheum 2011; 63(10): 3136-41.
10. Uaratanawong S, Suraamornkul S, Angkeaw S. Prevalence of hyperuricemia in Bangkok population. Clin Rheumatol 2011; 30(7): 887-93.
11. Wang P, Li X, He C, Zhai Y, Sun H, Zhang Y, et al. Hyperuricemia and prognosis of acute ischemic stroke in diabetic patients. Neurol Res 2019; 41(3): 250-56.
12. Hariklia VD, Apostolos H, Haralambosk. The role of uric acid in stroke. The lssue remains unresolved. Neurologist 2008; 14(4): 238-42.
13. Tushar B, Palil ASP, Kiran MS, Shegokar VE, Bansod YV, Patil MB, et al. Serum uric acid levels in acute ischemic stroke : a study of 100 patients. J Neurol Res 2011; 1(5): 193-200.
14. Kim SY, Guevara JV, Kim KM. Hyperuricemia and risk of stroke: a systematic review and harikliavd, apostolos h, haralambosk. the role of uric acid in stroke. The lssue remains unresolved. Neurologist 2008; 14(4): 238-42.
15. Yang XL, Kim Y, Kim TJ, Jung S, Kim CK, Lee SH. Association of serum uric acid and cardioembolic stroke in patients with acute ischemic stroke. J Neurol Sci 2016; 370(1): 57-62.
16. Kanbay M, Segal M, Afsar B, Kang D, Rodriguez-Iturbe B, Johnson RJ, et al. The role of uric acid in the pathogenesis of human cardiovascular disease. Heart 2013; 99(11): 759-66.
17. Wang YF1, Li JX, Sun XS, Lai R, Sheng WL. High serum uric acid levels are a protective factor against unfavourable neurological functional outcome in patients with ischaemic stroke. J Int Med Res 2018; 46(5): 1826-38.
18. Miedema I, Uyttenboogaart M, Koch M. Lack of association between serum uric acid levels and outcome in acute ischemic stroke. J Neurol Sci 2012; 319(1-2): 51–55.
19. Iranmanesh F, Sheykholeslami NZ, Gadari F, Ahmady J. Acute ischemic non-embolic stroke and serum level of uric acid. Iran J Neurol 2012; 11(1): 1–5.
20. Llull, L, Laredo C, Renú A. Uric acid therapy improves clinical outcome in women with acute ischemic stroke. Stroke 2015; 46(8): 2162-67.
21. Chen Y, Ding X, Teng J. Serum uric acid is inversely relate to acute ischemic stroke morbidity in hemodialysis patients. Am J Nephrol 2011; 33(2): 97-104.