Original Article

The Frequency of Hyperuricemia in Patients with Congestive Heart Failure

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ABSTRACT

Objective: To find the frequency of hyperuricemia in patients with congestive heart failure.
Study Design: Cross sectional study
Place and Duration of Study: This study was conducted at the Department of cardiology, Department of cardiology Qazi Hussain Ahmed Medical Institute Nowshera from 21st October, 2019 to 20th April, 2020.
Materials and Methods: About 145 patients presenting with heart failure and raised uric acid level, with age more than 18 years and less than 60 years of either gender were studied. Serum uric acid level was measured in a specialized lab. Chi square test was applied with $p < 0.05$ as significant value.
Results: Out of these 145 patients, 87 patients (60%) were male. "Among these 145 CHF patients, 93 patients (64.14%) were found to be hyperuricemic". Out of these 93 hyperuricemic patients, 82.8% in hyperuricemic patients or 53.1% in total patients were males. "About 38 patients (40.86%) were in NYHA Class II, 25 patients (26.88%) were in NYHA Class III and 30 patients (52.25%) were in NYHA Class IV."
Conclusion: Raised serum uric acid level is associated with bad prognosis in patients with Heart Failure especially in male population.

Key Words: Congestive Heart Failure (CHF), Hyperuricemia, serum uric acid (SUA), New York Health Association (NYHA).

Citation of article: Khan I, Ali U, Ahmad T, Arafat Y, Hidayatullah, Subhan S. The Frequency of Hyperuricemia in Patients with Congestive Heart Failure. Med Forum 2021;32(12):94-97.

INTRODUCTION

Heart failure is a one of the costly, commonly found and potentially fatal condition.[1] About 2% of adults have heart failure all over the world specially patients with age of more than 65 which increases the risk to 6–10%.[2,3]

There are a number of risk factors for heart failure with hyperurecemia being one of them. A Japanese study concluded that the prevalence of hyperuricemia increased during the 10-year follow-up. It was found to be more in men of age 65 years and even 4 times more in young males as compared to females.

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Received: August, 2021
Accepted: November, 2021
Printed: December, 2021

Hyperuricemia is an abnormally high level of uric acid in the blood. Uric acid level of 360 µmol/l (6 mg/dl) for women and 400 µmol/l (7.2mg/dl) for men is considered normal, depending on individual lab ranges.[4]

Raised serum uric acid is one of the most predictive factor for mortality in heart failure patients and also causes raised levels of cardiovascular diseases in patients specially with diabetes. If the patient has hypertension in addition to hyperuricemia, then the risk increases to 3- to 5-fold times. LIFE study in patients with hypertension and left ventricular hypertrophy suggested, a treatment-induced decrease in serum uric acid decreasing cardiovascular risk.

Franse et al, in his study showed a relationship between serum uric acid levels, diuretic treatment and the risk of cardiovascular diseases in the Systolic Hypertension in the Elderly Trial (SHEP).[5]

The aim of this study was to determine the frequencies of hyperurecemia and its effect in patients with congestive cardiac failure.

MATERIALS AND METHODS

This study was conducted at Cardiology unit, Qazi Hussain Ahmed Medical Institute Nowshera**.** Duration of the study was 6 months from 21st October, 2019 upto 20th April, 2020 and the study design was cross sectional (descriptive) study. Sample size was calculated using WHO sample size calculator with 95% confidence interval and 5% margin of error. Non

probability consecutive sampling technique was used. Patients with age more than 18 years and less than 60 years of either gender, presenting to Cardiology Unit, with heart failure symptoms were included in the study.
A level of more than 7.2mg/dl for adult males & older women while level of more than 6mg/dl for young women was considered as hyperurecemia. Patients already on drugs which can increase serum uric acid level, with malignancies and other conditions with rapid cell turnovers were excluded. This study was approved by hospital ethical and research committee.
Patients were subjected to history and examination. "Heart Failure severity was assessed using New York Health Association (NYHA) classification." A 5 cc of blood was taken from all the patients and was sent to hospital laboratory on the same day.
Data collected was entered in SPSS 21. "Mean ± SD was calculated for continuous variable like age and serum uric acid levels and categorical variable like gender was expressed as frequencies and percentages". Chi square test was applied with $P < 0.05$ as significant value.

RESULTS

About 145 patients with signs and symptoms of Heart Failure were included. Out of these, 87 patients (60%) were males. About 93 patients (64.14%) were found hyperuricemic as shown in table 1. Among these 93 hyperuricemic patients, 77 patients were male , while in normourecemic patients 10 were males and 42 were female (table 1). Among these 145 CHF patients, patients with age between 18 to 40 years were 7 (4.83%), between 41 to 50 years were 41 (28.27%) while between 51 to 60 years were 97 (66.90%). Mean age was 57± 2.73 years.(table 2) In total 93 Hyperuricemic patients, those between age group of 18 to 40 years were 3 (3.22%), between 41 to 51 years were 21 (22.58%) while between 51 to 60 years were 69 (74.19%). The mean age was 55 ± 3.58 years. (Table 3). About 78 patients (53.79%) were in 'NYHA Class II', 35 patients (24.14%) in 'NYHA Class III' while 32 patients (22.07%) were in 'NYHA Class 4' (table 4). Only 2 patients (1.38%) with serum uric acid (SUA) below 6 mg/dl were in NYHA IV compared to 24 patients (16.54%) whose SUA was above 8 mg/dl. Mean uric acid (SUA) levels are 7.7 ± 2.17 md/dl. (table 5)

Table No. 1: Stratification of CHF patients with respect to hyperuricemia and gender: (N=145)

Gender	Hyperuricemic		Normouricemics		Total	
	No.	**%Age**	**No.**	**%Age**	**No.**	**%Age**
Male	77	53.11	10	6.89	87	60
Female	16	11.03	42	28.96	58	40
TOTAL	93	64.14	52	35.86	145	100

Table No. 2: Stratification of CHF patients with respect to age: N=145

Age (years)	Frequency	Percentage
18 - 40	7	4.83
41 - 50	41	28.27
51 - 60	97	66.90
total	145	100

Mean age was 57 years with SD ± 2.73.

Table No. 3: Stratification of hyperuricemia with respect to age: (N=93)

Age (years)	Frequency	Percentage	
		In hyperuricemic	In total
18 – 40	3	3.22	2.07
41 – 50	21	22.58	14.48
51 – 60	69	74.19	47.58
TOTAL	93	100	64.14

Mean age was 55 years with SD ± 3.58.

Table No 4: Severity Distribution of Congestive Heart Failure Patients:(N=145)

Severity	Frequency	Percentage
NYHA Class II	78	53.79
NYHA Class III	35	24.14
NYHA Class IV	32	22.07
Total	145	100

NYHA= New York Heart Association

Table No. 5: Serum uric acid levels and severity of congestive heart failure: N=145

SUA (mg/dl)	NYHA II		NYHA III		NYHA IV		Total		P value
	No.	%Age	No.	%Age	No.	%Age	No.	%Age	
<6	40	27.59	10	6.89	2	1.38	52	35.86	0.12
6 - 8	30	20.69	12	8.27	6	4.14	48	33.10	0.06
8.1 - 12	8	5.51	11	7.59	14	9.65	33	22.76	0.002
>12	0	0	2	1.38	10	6.89	12	8.27	0.001
TOTAL	78	53.79	35	24.14	32	22.07	145	100	

NYHA= New York Heart Association

DISCUSSION

Heart Failure is not just a hemodynamic disorder but it also causes the activation of neuroendocrine and immune system, causing further damage. Long-term course of heart failure, not only involves the heart and muscles but it also causes its effect on peripheral tissues and organs due to reduced blood supply, increasing to the disease burden. The heart failure pathophysiology

involves metabolic disturbances, cellular hypoxia as well as hormonal abnormalities.[6] "Increased UA levels have been reported in heart failure patients and recent clinical data supports the possibility that UA adds important prognostic information alone and in combination with other measures of cardiac function and patient functional status in this group."[7] Some of the studies have reported hyperuricemia, an increased risk of all cause mortality in heart failure patients. In a meta-analysis of patients with Heart Failure, it was also found that high UA levels is one of the leading cause of all-cause mortality .[7] "Our findings are consistent with previous observations which found hyperuricemia was common in patients with HF." "Higher uric acid level was independently associated with long term adverse outcomes in these patients".[8]

In patients with HF, hyperurecemia was found irrespective of their use of diuretics , renal issues and other factors.[9] UA levels were previously been correlated with LV functions in heart failure patients.[8] Anker et al. demonstrated relationship between serum UA levels and prognosis in patients with systolic dysfunction. This study also reported hyperuricemia as a cause of exercise intolerance. [9]

"In our study, UA was found to be higher among symptomatic Heart Failure patients as compared to asymptomatic patients". "About 25.51% of the hyperuricemic patients were in NYHA III and NYHA IV whose UA level was more than 8 mg/dl as compared to 12.41% hyperuricemic patients with UA less than 8 mg/dl with mean UA levels was significantly higher in higher NYHA class". This finding can be used as a biomarker for the prognosis in HF patients. Uric acid level is correlated ejection fraction as evident by the study. "Therefore, we believe UA levels may be useful to assess the extent of LV remodeling".

Hypertension, renal dysfunction, and coronary artery disease is directly related to serum uric acis level. The lower the level the better the prognosis.[11] This may be a cause of hypertension in heart failure patients and its prognostic effect on the patients as it was observed in our study. [12]

The significance of our observation lies in its use for developing a risk prediction rule for heart failure, however literature has conflicting evidence regarding use of uric acid as a mortality predictor [12].

"Randomized controlled studies have also been unclear about the putative benefit of allopurinol or its metabolite oxypurinol on established heart failure. Although La Plata study showed improvement in left ventricular ejection fraction with the use of allopurinol."[13]

CONCLUSION

Serum uric acid is strongly related to exacerbation of chronic heart failure in cardiac patients. It can be used as one of the prognostic factor for asymptomatic as well as from symptomatic patients of CHF.

Author's Contribution:

Concept & Design of Study:	Imran Khan
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Revisiting Critically:	Imran Khan, Umair Ali
Final Approval of version:	Imran Khan

Conflict of Interest: The study has no conflict of interest to declare by any author.

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