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Prognostic Significance of Serum Uric Acid in Heart Failure

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Introduction

- Heart failure is a burgeoning problem worldwide and its prevalence increases with increasing age.
- Coronary artery disease accounts for substantial portion of patients with chronic heart failure.
- Heart failure is associated with increase in circulating levels of BNP(Brain Natriuretic Peptide) and other markers like uric acid, troponin T and I , C-reactive protein, TNF receptors etc.,
- As heart failure is leading cause of mortality, ability to predict prognosis is essential for treatment purposes.
- Studies have shown that apart from BNP, serum uric acid is found to have prognostic value as well.
- Increased uric acid levels are associated with impairment of vascular nitric oxide causing increased vascular tone and depressed myocardial contractility via increase in xanthine oxidase activity and therefore associated with hemodynamic compromise in heart failure.

- Tamariz et al. in a meta analysis with 1456 patients found the estimated threshold for serum uric acid level as 6.5mg/dl.
- A linear association was found between serum uric acid levels and mortality after 7mg/dl.
- Other studies also shown that uric acid is independent marker of poor prognosis in patients with heart failure.
- Therefore uric acid is considered as biomarker in heart failure.

Aim & Objectives

1. To evaluate serum uric acid levels in patients with heart failure
2. To correlate serum uric acid levels with different classes of NYHA and its prognostic significance in heart failure.

Materials and Methods

Source of Study: 50 patients with heart failure for at least 1month duration as cases were taken from department of cardiology, GEMS hospital, Srikakulam. Informed consent was obtained from all patients. 50 age and sex matched controls were taken.

Study Design: Case control study

Study Period: October 2021- July 2022

Duration of Study: 10months

Inclusion Criteria

- Patients of both sex between 20-80years
- Patients with heart failure for at least 1 month duration
- Patients with heart failure both with preserved and reduced ejection fraction

Exclusion Criteria

- Patients with pre existing gout
- Patients on long standing diuretics
- Chronic kidney disease
- Hematological malignancy
- On ATT

Collection of Data

- This is a case control study.
- A questionnaire was prepared regarding symptoms, duration and treatment of heart failure.
- Questions were asked in relation to chest pain, dyspnoea, syncope, cough, smoking and medications.
- All previous clinical records of the patients were analyzed .
- Based on the symptoms, patients were assigned to NYHA class I to IV of heart failure.
- Patients volume status (rales, edema, jugular venous distension), weight, height, body mass index were assessed and obesity is defined when BMI>30kg/m2
- Blood pressure was measured and according to JNC 8, hypertension is defined when BP>140/90.
- Complete blood count, blood glucose (fasting and 2 hour post prandial), fasting serum lipid profile, blood urea, serum creatinine and serum electrolytes were measured in all patients.
- Two-dimensional echocardiography was done in the cardiology department of GEMS hospital for all patients.

- Serum uric acid levels were measured on admission for all the 50 patients who met the inclusion criteria and compared with 50 age and sex matched controls.
- Diabetes mellitus is defined if
  1. Plasma glucose of 126mg/dl or greater after overnight fasting
  2. Post prandial Plasma glucose of 200 mg/dl or greater
  3. Symptoms of DM with random glucose 200 mg/dl or greater
  4. HbA1C > 6.5%
- Dyslipidemia is defined if
  Serum total cholesterol >/= 200 mg/dl
  Serum HDL</=40mg/dl
  Serum triglycerides >/= 200 mg/dl
  Serum LDL >/= 160 mg/dl
- Normal values of serum uric acid
  Serum Uric Acid (males) = 3.0 to 7.0 mg/dl
 Serum Uric Acid (females) = 2.5 to 6.0 mg/dl

Statistical Analysis

- Following statistical methods have been employed in the present study.
- Independent samples 't' test-Unpaired.
- Independent samples 't' test-Paired.
- One-way Analysis of Variance (ANOVA).
- Pearson correlation coefficient.
- Relative risk.
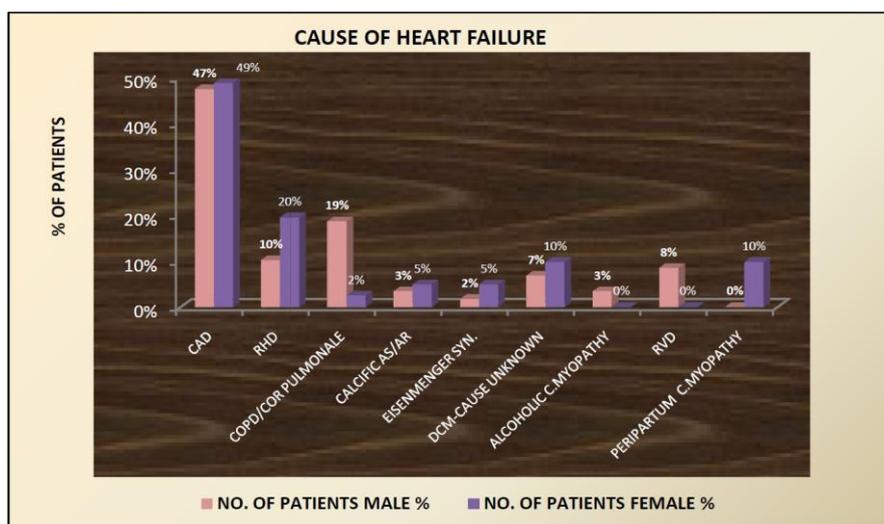
Results & Discussion

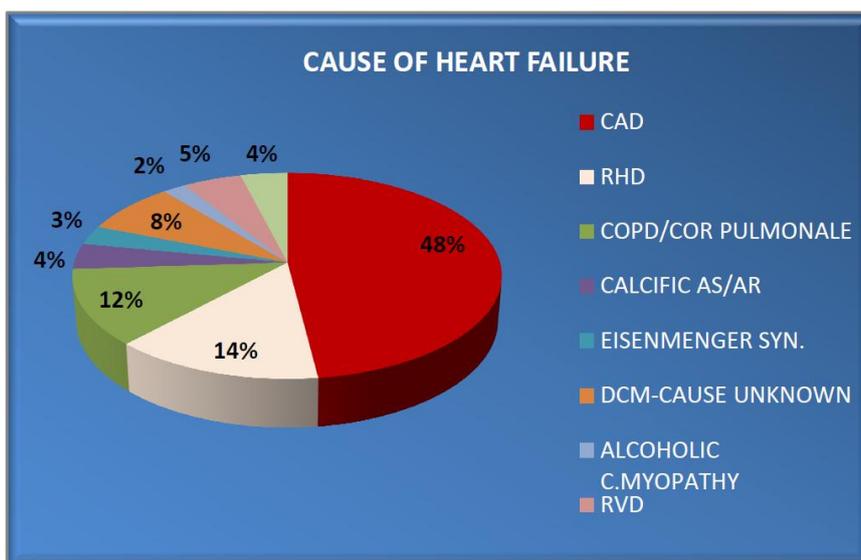**Age Distribution:** Mean age group is 34years
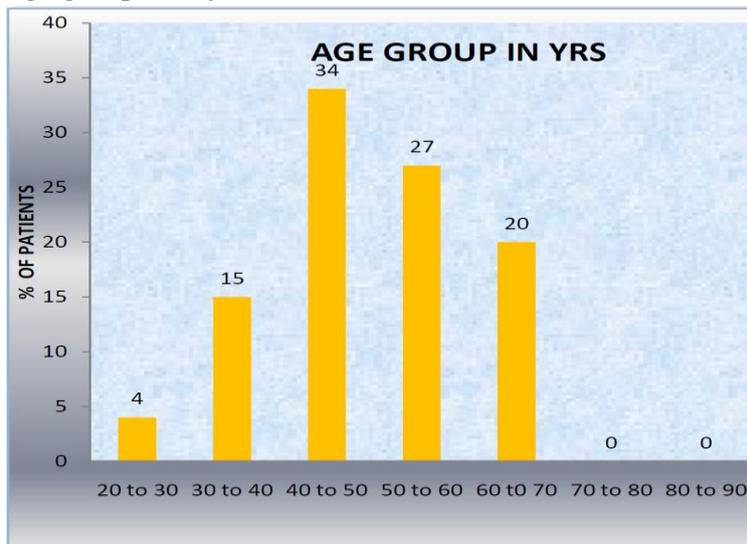
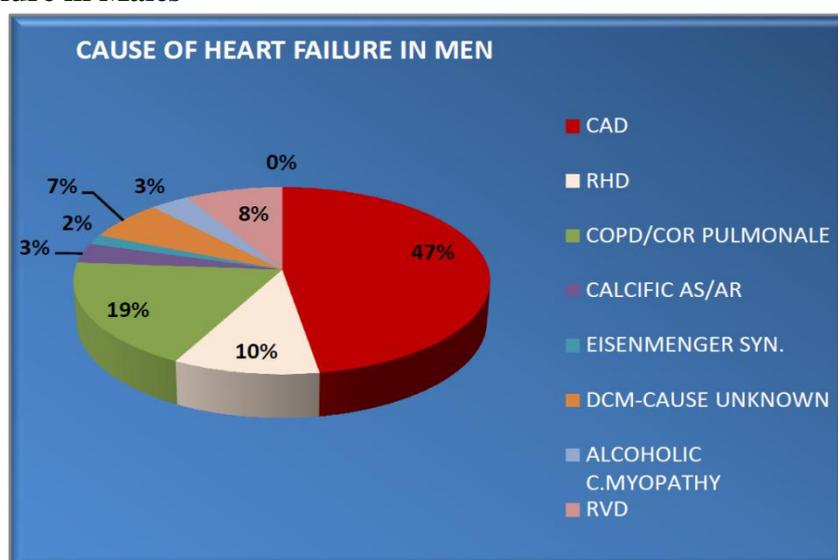**Age Distribution among Males and Females**
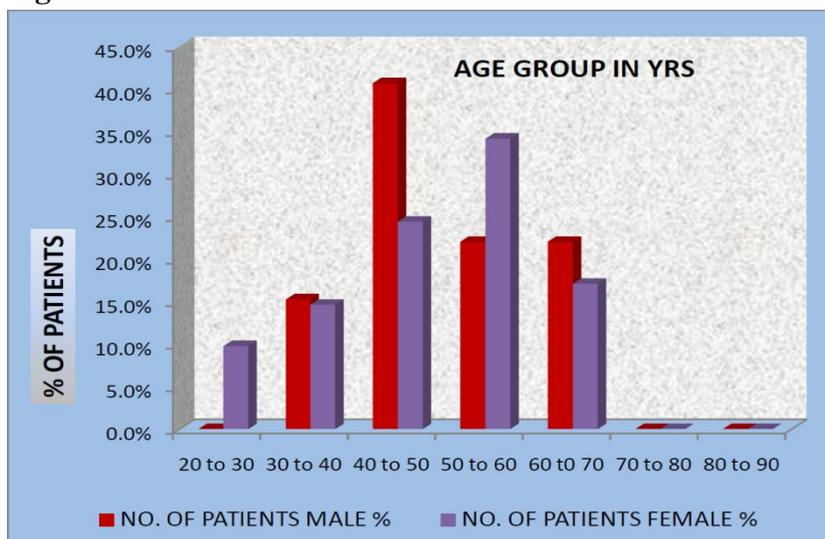
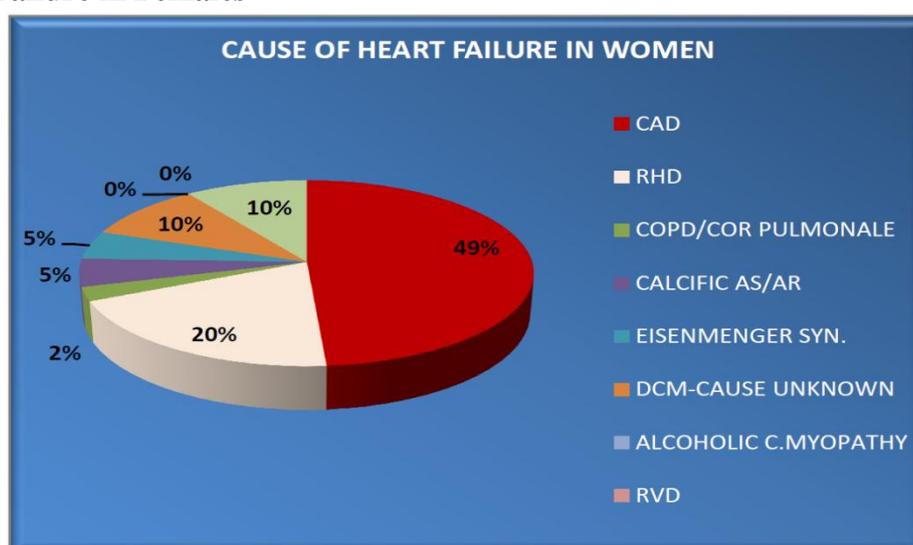**Distribution of Various Causes of Heart Failure**
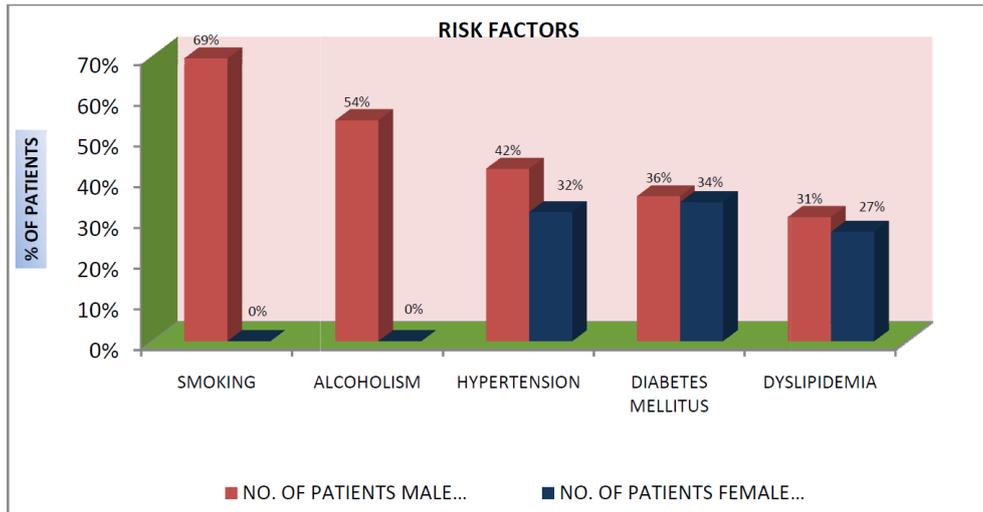
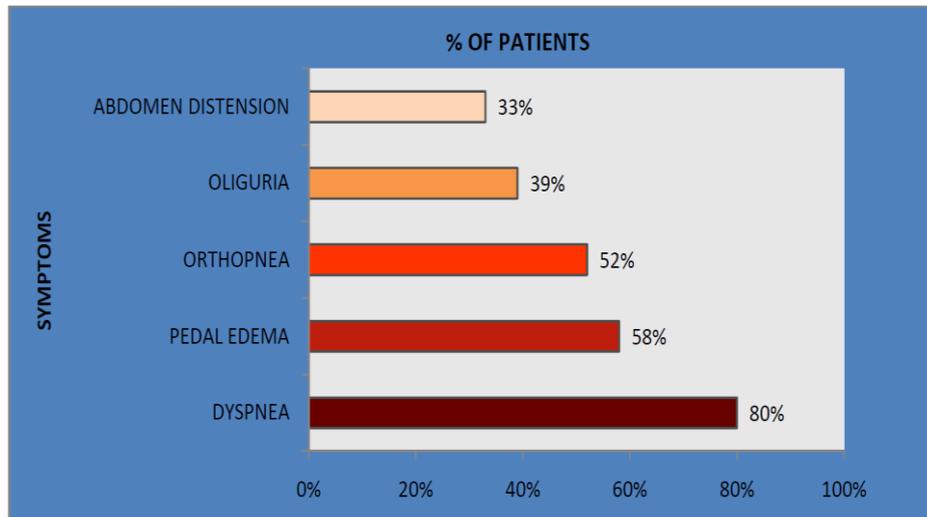**Causes of Heart Failure**

Causes of Heart Failure in Males

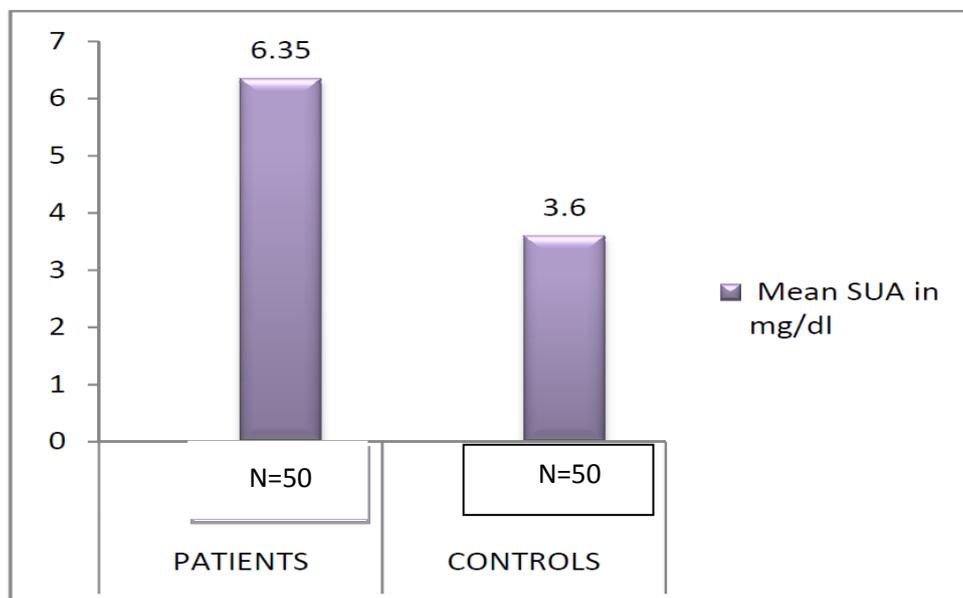**Causes of Heart Failure in Females**
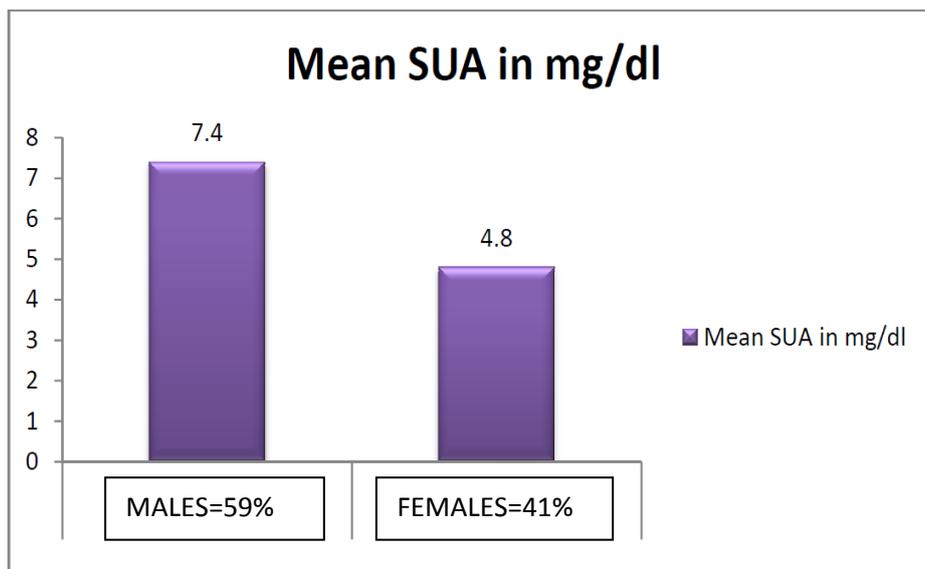
Distribution of Risk Factors in Both Sexes

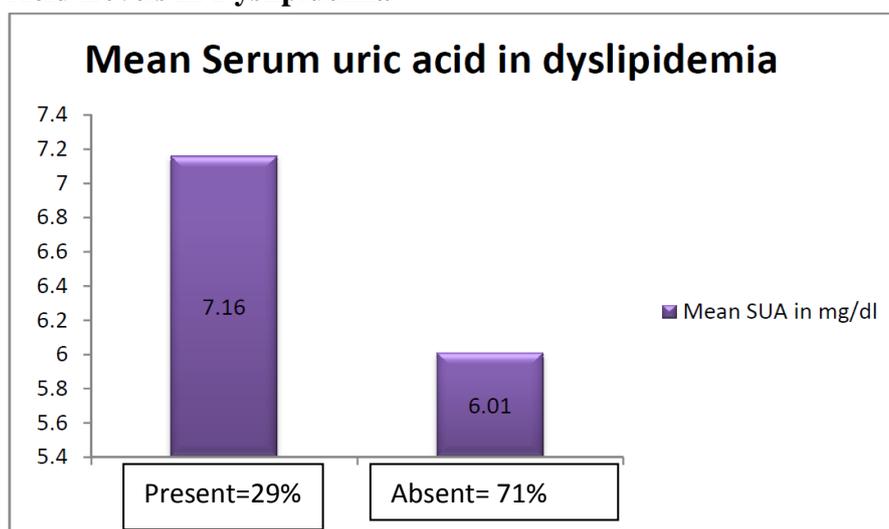**Chart Showing Various Symptomatologies**

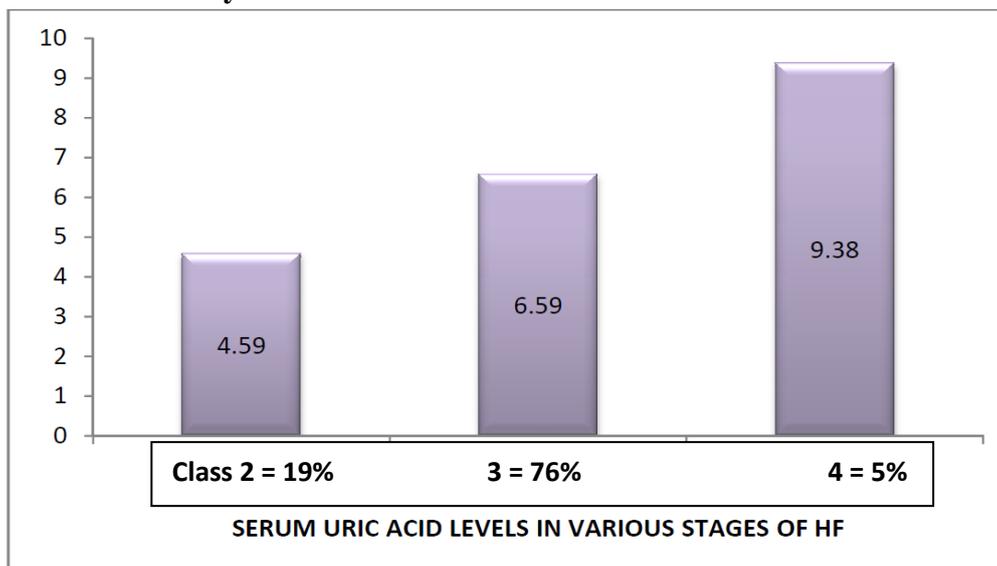**Mean Serum Uric Acid Levels in Patients And Controls**
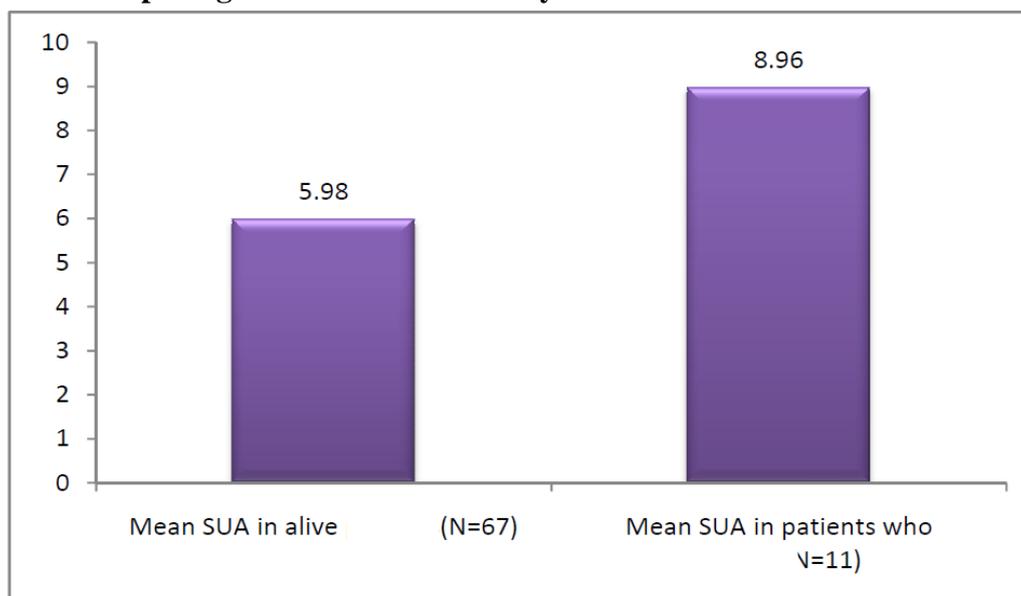
Mean Serum Uric Acid Levels in Males and Females

Mean Serum Uric Acid Levels in Dyslipidemia

Mean Sua Levels in Various Nyha Classes

Mean SUA Levels Comparing Survival and Mortality

Discussion

- We have studied 50 patients with heart failure and 50 age and sex matched controls.
- Mean age group of patients with heart failure was 50years with minimum age of 28years and maximum age of 68years.
- Out of 50 patients 59% were males and 41% were females. The mean age among males is 50years and females are 49years.
- Of the males 47% had CAD, 19% had COPD, 10% had RHD, 7% had DCM-unknown cause. Among the females 49% of CAD, 20% had RHD, 10% had DCM unknown cause and 10% had peripartum cardiomyopathy.
- Out of the 50 patients studied, smoking was present in 41%, hypertension in 38%, diabetes mellitus in 35% of patients.
- Among the patients 80% had dyspnea, 58% had pedal edema, 52% had orthopnea, 39% had oliguria and 33% had abdominal distension.
- Mean serum uric levels in patients with heart failure is 6.35+/-5 and in controls is 3.6+/-1 (p value <0.0001)
- The mean serum uric acid level was 7.16 in those with dyslipidemia and 6.01 mg/dl in those without dyslipidemia. These were

compared by the unpaired t test and it was found that the p value was > 0.9999 and it was not significant.
- Mean serum uric acid levels in class 2, 3, 4 NYHA are 4.59+/-1.89; 6.59+/-1.83; 9.38+/-1.89 respectively and compared using ANOVA test(p value <0.0001)
- The mean serum uric acid level between those patients who are alive(5.98) were compared with those who expired(8.96) and it was found to be statistically significant (p<0.001)

Conclusion

- Serum uric acid levels are higher in patients of heart failure as compared to normal age and sex matched healthy persons.
- Patients in higher NYHA Class of heart failure have higher serum uric acid levels, thus serum uric acid levels correlated with NYHA Class of heart failure.
- Uric acid is not only a bystander marker but probably also a causative marker of mortality in patients who have heart failure.
- Combination of NYHA Class of heart failure and serum uric acid level is a good predictor of mortality of heart failure.

- Any drug interventions, such as therapy to decrease serum uric acid in addition to other drugs used in heart failure, may have a favourable outcome in patients who have heart failure.

References

1. Harrisons Principles of Internal Medicine 21st edition.
2. Leonardo Tamariz , Arash Harzand , Ana Palacio, John Jones , Joshua Hare Uric Acid as a Predictor of All-Cause Mortality in Heart Failure: A Meta Analysis, Volume 17, Issue 1, pages 25–30, January/February 2011
3. F. Leyva, S.D. Anker , I.F. Godsland .Uric acid in chronic heart failure: a marker of chronic inflammation. Pp. 1814-1822 European heart journal volume 19 issue 12
4. Anker SD, Doehner W, Rauchhaus M, et al. Uric acid and survival in chronic heart failure: validation and application in metabolic, functional, and hemodynamic staging. Circulation. 2003; 107: 1991–1997
5. Jankowska EA, Ponikowska B, Majda J, et al. Hyperuricaemia predicts poor outcome in patients with mild to moderate chronic heart failure. Int J Cardiol. 2007; 115: 151–155.
6. Hen JH, Chuang SY, Chen HJ, et al.Serum uric acid level as an independent risk factor for all-cause, cardiovascular, and ischemic stroke mortality: a Chinese cohort study. Arthritis Rheum. 2009; 61: 225–232.