



EVALUATION OF RENAL DYSFUNCTION IN PATIENTS OF HEART FAILURE WITH OR WITHOUT THYROID DYSFUNCTION AND ITS PROGNOSTIC ROLE IN TERMS OF HOSPITAL STAY

Prof Anubha Srivastava	MD, Professor, Department of Medicine, MLN Medical College, Prayagraj
Prof Piyush Saxena	MD, Professor, Department of Medicine, MLN Medical College, Prayagraj
Dr Dheeraj Kumar Yadav*	Junior Resident, Department of Medicine, MLN Medical College, Prayagraj *Corresponding Author
Dr. Ashutosh Pathak	MD, Assistant Professor, Department of Medicine, MLN Medical College, Prayagraj.
Dr. Richa Singh	MD, Associate Professor, Department of Social and Preventive Medicine, MLN Medical College, Prayagraj

ABSTRACT

Aim – To study renal dysfunction in patients of heart failure with or without thyroid dysfunction and assess its prognostic value in terms of hospital stay. **Material And Methods** – A Prospective observational study was conducted at MLN Medical College, Prayagraj. A total of 185 consecutive adult heart failure patients were enrolled in the study after following inclusion and exclusion criterias. **Result** – Prevalence of thyroid disorders was 28.6% (6.5% hyper and 22.2% hypothyroid). Serum urea and creatinine levels of patients with thyroid dysfunction were significantly higher as compared to those having euthyroid status ($p < 0.05$). Heart failure patients with thyroid dysfunction had a prolonged hospital stay ($p < 0.05$) **Conclusion** – Heart failure patients with thyroid dysfunction had significant impairment in renal function tests, i.e. both serum urea and creatinine as compared to those without thyroid dysfunction and also showed a prolonged hospital stay.

KEYWORDS : Heart failure, Thyroid dysfunction, Renal dysfunction

INTRODUCTION

- The primary hemodynamic problem in heart failure is related to abnormalities in myocardial function i.e. preload, afterload and contractility, however multiple presenting signs and symptoms are due to end organ failure including dysfunction of kidneys, liver and lungs.¹
- The heart and kidney interaction increases circulatory volume, worsens symptoms of heart failure and results in disease progression.¹
- Thyroid hormones may have an impact on renal development, kidney structure, renal hemodynamics, GFR and sodium and water homeostasis. The widespread effects of thyroid hormone may be due to direct renal actions or mediated by cardiovascular and systemic hemodynamic effects that impact kidney function.²
- As a consequence, both hypothyroidism and hyperthyroidism patients have seen association with clinically important alterations in kidney function especially in heart failure patients.²
- Considering the impact of thyroid dysfunction in altering the renal profile in patients of heart failure, the present study was planned to study the renal dysfunction in patients of heart failure with or without thyroid dysfunction.

MATERIAL AND METHODS:

Study design: Prospective Observational Study

Study duration & place:

21st July 2021 to 20th July 2022, at SRN Hospital, Prayagraj.

Inclusion Criteria :

Age >18years (male or female) presenting to the cardiology dept with signs and symptoms of heart failure based on history, examination, ECG, BNP and 2-D Echo.

Exclusion Criteria:

Those unwilling for study related diagnostic procedures were excluded.

- A total of 185 consecutive heart failure patients aged >18

years underwent demographic, clinical, hematological, biochemical and thyroid profile assessment.

- Details of the diagnosis of heart failure were ascertained using history, examination, ECG, BNP and 2-D Echo. The grading of heart failure was done using New York Heart Association (NYHA) functional classification.
- Euthyroidism was defined as TSH of 0.5 to 4.94 mIU/L with fT3 and fT4 in normal range, hypothyroidism as TSH of ≥ 4.94 , and hyperthyroidism as TSH <0.5 mIU/L.
- Patients were followed up till discharge/outcome

RESULTS:

Out of the total 185 heart failure patients enrolled in the study, majority of cases were males ($n = 106$; 57.3%). Sex-ratio (M:F) of study population was 1.34. Age of patients ranged from 19 to 90 years. Mean age of patients was 58.39 ± 13.98 years. Fig 1 and 2 show the gender and age distribution of cases respectively.

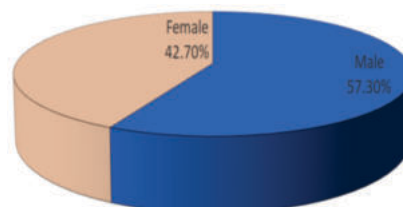


Fig. 1: Gender distribution of cases

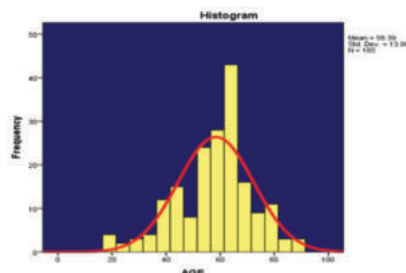


Fig. 2: Histogram showing age dispersion of cases

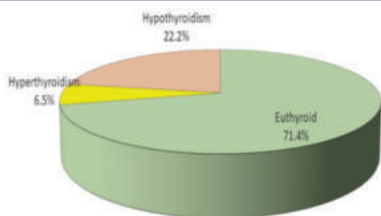


Fig. 3: Distribution of cases according to thyroid function status

Fig 3 shows that Majority of patients had a euthyroid status (71.4%). There were 12 (6.5%) patients with hyperthyroidism and 41 (22.2%) with hypothyroidism. Overall, a total of 53 (28.6%) patients had thyroid dysfunction.

Table 1 shows that the proportion of those in NYHA class 3 and 4 was significantly higher in thyroid dysfunction group (61.5%) as compared to euthyroid patients (41.7%) (p=0.009).

It also depicts that serum urea and creatinine levels of patients with thyroid dysfunction were significantly higher as compared to those having euthyroid status (p<0.05).

Mean duration of hospital stay was significantly longer in patients with thyroid dysfunction (3.74±0.92 days) as compared to those having euthyroid status (3.45±0.86 days) (p=0.050), as shown in table 1.

Table 1: Comparison of Demographic and Clinical Profile of patients with and without thyroid dysfunction

SN	Characteristic	Thyroid dysfunction (n=53)		No thyroid dysfunction (n=132)		Statistical significance	
		Mean / No.	%/ SD	Mean/ No.	%/ SD	't'/2	'p'
1.	Mean age ± SD (Range) in years	59.72±11.81 (27-84)		57.86±14.78 (19-90)		t'=0.818;	p=0.415
2.	Male sex	29	54.7%	77	58.3%	0.202	0.653
3.	NYHA Class						
	1/2	21	39.6%	77	58.3%	5.314	0.021
	3/4	32	60.4%	55	41.7%		
4.	Median BNP [IQR] (ng/ml)	765 (572.5-1200)		712 (516-1120)		z=1.394;	p=0.163 (Mann Whitney U test)
5.	Hematological parameters						
	Hb (g/dl)	10.69	2.25	11.84	2.05	-3.35	0.001
	TLC (thousands/cumm)	12.17	5.38	14.36	13.77	-1.12	0.263
	Platelet count (lakhs/cumm)	1.86	0.82	1.70	0.88	1.08	0.283
6.	Kidney functions						
	S. urea (mg/dl)	70.23	47.22	55.96	34.97	2.26	0.025
	S.Creatinine (mg/dl)	1.80	1.41	1.37	0.69	2.80	0.006

7.	Preserved EF (>50%)	20	37.7%	31	23.5%	3.846	0.050
8.	Mean duration of hospital stay ± SD (Range) in days	3.74±0.92		3.45±0.86		t=1.97; p=0.050	
9.	Outcome						
	Discharged	49	92.5	124	93.9	0.138	0.711
	Expired	4	7.5	8	6.1		

DISCUSSION:

The present study included only adult patients aged between 19 and 90 years, thus showing a broad spectrum of age. Mean age of patients was 58.39±13.98 years. Male preponderance was seen (57.3%). It was observed that there was significant impairment in renal function, i.e. significant increase in both serum urea and creatinine values, in patients of heart failure with thyroid dysfunction as compared to those without thyroid dysfunction. Moreover, heart failure patients with thyroid dysfunction were observed to have a longer duration of hospital stay. Similar findings were observed by Merla R et al where they found that heart failure patients with improperly treated hypothyroidism had worse renal function as compared to patients who were euthyroid or whose hypothyroidism was effectively treated.³

Also, it has been noted in many studies that as renal function worsens in heart failure patients, their prognosis becomes poorer, requiring more hospitalizations and a higher all cause mortality rate signifying the importance of normal renal function in heart failure patients.^{4,5,6}

There are hardly any studies which have shown an association of thyroid dysfunction on the renal function in heart failure patients and the present study intends to fill this gap in the existent pool of knowledge. The present study has thrown light upon the impact of thyroid dysfunction on worsening renal function and a prolonged hospital stay in heart failure patients which may have therapeutic and prognostic implications. Further studies on larger sample size are needed to corroborate these findings as early diagnosis and effective treatment of thyroid dysfunction in heart failure patients may prove fruitful in their long term outcome.

CONCLUSION:-

- Heart failure patients with thyroid dysfunction had significant impairment in renal function tests, i.e. significant increase in both serum urea and creatinine as compared to those without thyroid dysfunction.
- Moreover, heart failure patients with thyroid dysfunction were observed to have a longer duration of hospital stay which may have prognostic implications.
- Further studies on larger sample size and follow up of renal function with treatment of thyroid disorder are needed to strengthen the relationship of thyroid disorders and its effect on renal function in heart failure patients.

Conflict Of Interest:

None

Limitation:

Despite the best efforts, our study had few limitations:

1. The sample size of our study was small involving only a single centre patients of heart failure which might not be representative of the overall heart failure population.
2. Owing to lack of long term follow up for our patients, we cannot comment whether treatment of thyroid dysfunction in an early course of disease will improve the renal function in heart failure patients.
3. We only analyzed the patients who reached the hospital

so it might not be a true representative of the population.

REFERENCES –

1. Loscalzo J, Kasper DL, Longo DL, Fauci AS, Hauser SL, Jameson JL, et al. chapter 257 Heart failure - pathophysiology and diagnosis. In: Harrison's® principles of internal medicine. New York: McGraw Hill; 2022.
2. Mariani LH, Berns JS. The renal manifestations of thyroid disease. *Journal of the American Society of Nephrology*. 2011;23(1):22–6.
3. Merla R, Martinez JD, Martinez MA, Khalife W, Bionat S, Bionat J, Barbagelata A. Hypothyroidism and renal function in patients with systolic heart failure. *Tex Heart Inst J*. 2010;37(1):66-9.
4. Damman K, Navis G, Voors AA, Asselbergs FW, Smilde TD, Cleland JG, et al. Worsening renal function and prognosis in heart failure: systematic review and meta-analysis. *J Card Fail* 2007;13(8):599-608
5. Cheitlin MD. Renal function as a predictor of outcome in a broad spectrum of patients with heart failure. *Yearbook of Cardiology*. 2007;2007:327–8.
6. Hillege HL, Nitsch D, Pfeffer MA, Swedberg K, McMurray JJ, Yusuf S, Granger CB, Michelson EL, Ostergren J, Cornel JH, de Zeeuw D, Pocock S, van Veldhuisen DJ; Candesartan in Heart Failure: Assessment of Reduction in Mortality and Morbidity (CHARM) Investigators. Renal function as a predictor of outcome in a broad spectrum of patients with heart failure. *Circulation*. 2006 Feb 7;113(5):671-8. doi: 10.1161/CIRCULATIONAHA.105.580506.