|| ISSN(online): 2589-8698 || ISSN(print): 2589-868X ||
International Journal of Medical and Biomedical Studies
Available Online at www.ijmbs.info
NLM (National Library of Medicine ID: 101738825)
Index Copernicus Value 2019: 79.34
Original Research Article
Volume 5, Issue 8; August: 2021; Page No. 135-138

PREVALENCE OF IRON DEFICIENCY ANEMIA AND ITS OUTCOME WITH THREE MONTHS ORAL IRON THERAPY IN PATIENTS WITH CHRONIC HEART FAILURE

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Article Info: Received 19 June 2021; Accepted 05 August 2021
DOI: https://doi.org/10.32553/ijmbs.v5i8.2094
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Conflict of interest: No conflict of interest.

Abstract

Background: To find out the prevalence of Iron deficiency Anemia in CHF patient. Prognostic outcome of treating the underlying Iron deficiency anemia in CHF patient with 3 month oral iron therapy will be measured by peak oxygen uptake, 6 minute walk test, 2D-Echo finding. **Methods:** The present study was conducted in Cardiac Care Unit (ICCU) of Medicine Department, Dr. S. N. Medical College, Jodhpur. Detailed data collected from 200 patients of congestive heart failure with reduced ejection fraction (LVEF<45%). Patients of acute decompensated heart failure were managed according to standard management guidelines and stabilized. After stabilizing the patient, they were investigated according to the patient Performa. **Results:** Before therapy, 4 patients had NYHA class II symptoms (9.8%) and 13 had NYHA class III symptoms (31.7%). After 3 months of oral iron therapy, 6 patients were having NYHA class I symptoms, 13 having NYHA class II symptoms and 19 patients were having NYHA class 13 symptoms out of 41 patients. This shows significant improvement in NYHA functional class (P value<0.001). Functional status although improved without change in LV dimensions. **Conclusion:** Patient with chronic heart failure has high morbidity and mortality despite multimodal therapy. Iron deficiency anemia is common associated co morbidity in HF patients. Oral Iron therapy is associated with improvement in NYHA functional class, patient's global assessment and 6MWT distance.
Keywords: NYHA, MWT, CHF

Introduction

Heart failure is a clinical syndrome that occurs in patients who, because of an inherited or acquired abnormality of cardiac structure or function, develop a cascade of clinical symptoms and signs that lead to frequent hospitalizations, a poor quality of life and a shortened life expectancy. Heart failure (HF) is a major public health problem, with a prevalence of more than 5.8 million in the United States and more than 23 million patients worldwide.[1]

Chronic heart failure (CHF) is a progressive syndrome that results in a poor quality of life for the patient and increases economic burden on the health care system. Despite advances in the control of cardiovascular diseases such as myocardial infarction (MI), the incidence and prevalence of CHF continue to increase.[2] An accurate estimate of disease burden is difficult to gather because of the vast number of patients with asymptomatic left ventricular (LV) dysfunction. As the population ages, there is an epidemiological shift towards a greater prevalence of clinical heart failure with preserved LV function, the so–called stiff–heart syndrome. Heart failure with preserved systolic function accounts for up to two–thirds of cases in patients older than 70 years.[3] Regardless of age, the lifetime risk of developing heart failure is approximately 20% for all patients older than 40 years.[4]

Materials and Methods:

Inclusion Criteria:

Patients of CHF as diagnosed with Framingham heart failure criteria will be included in the study

Patients with:

(1) Left ventricular ejection fraction <40% (Framingham heart failure criteria) Diagnostic criteria of heart failure.

Major criteria

1. Acute pulmonary edema
2. Cardiomegaly (Def. on Chest x–ray transverse diameter of the cardiac silhouette greater than to 50% of transverse diameter of chest).
3. Hepatojugular reflex (Distention of neck vein when pressure is applied over the liver).
4. Neck vein distended (External jugular vein)
5. Orthopnea
6. Rales (Small clicking, bubbling or rattling sounds in the lungs during inspiration)
7. S3 gallop

Minor Criteria

1. Ankle edema
2. Dyspnea on exertion
3. Hepatomegaly
4. Nocturnal cough
5. Pleural effusion (By Chest x–ray blunting of costophrenic angle and blunting of cardiophrenic angle).
6. Tachycardia (>120)

Heart failure is Diagnosed when 2 major or 1 major and 2 minor criteria are met[73].

(2) New York Heart Association (NYHA) functional class 1st to 4th

Exclusion criteria:

Patients on Hemodialysis, with Chronic kidney disease (CKD), Vitamin b12 deficiency anemia and Critically ill patient(on mechanical ventilation) will be excluded

Study subject- Patient admitted with clinical symptom like dyspnea, fatigueand sign (ankle edema, rales) and diagnosed by framingham heart failure criteria will be grouped according to NYHA functional class and further investigated for iron deficiency anemia (as per WHO criteria defines anemia as haemoglobin level <13gm/dl in men and <12gm/dl in women.) After diagnosis of iron deficiency anemia patient will be treated with 3 month oral iron therapy and outcome will be measured by peak oxygen uptake, 6 minute walk test,2D-echo finding

Data Collection:

All patients who meet the inclusion criteria will be recruited in the study and details will be documented in the proforma which will include name, age, sex, registration number, contact detail, past history and family history of diabetes mellitus, hypertension, CHF along with documentation of symptoms at presentation. Furthermore, the study subjects will be tested for serum iron, serum TIBC, serum ferritin along with CBC, RFT, LFT and 2D-Echo.

1. Type of study: Cross sectional, Prospective study.
2. Investigations required for the study:

a. Complete blood count. (by automation sysmax machine)
b. RFT and LFT (By Beckman coulter AU 680 machine)
c. Serum Electrolytes (Sodium Potassium) (electrolyte Analyzer machine)
d. Peak Oxygen Uptake (by maximal graded exercise test on treadmill)
e. 2D Echo (VIVIDE 9 machine)
f. NYHA Functional Classes
g. Serum ferritin and TIBC (Total Iron Binding Capacity) and Transferring Saturation (<20%)

Observations

Table 1: age wise distribution of study population (N=200)

Age group (years)	Number of patients	Percentage (%)
20-30 years	2	1.0
31-50 years	52	26.0
51-70 years	160	80.0
>70 years	40	20.0
Age Range (years)	25-100	
Mean± SD (years)	60.36±13.73	

Table 2: sex distribution of study population (N=200)

Sex	Number of patients	Percentage (%)
Male	104	52.0
Female	96	48.0
M:F Ratio	1.08:1	

Table 3: prevalence of iron deficiency anaemia in chf subjects (N=200)

Iron deficiency anaemia	Number of Patients	%
Present	41	22.5
Absent	159	77.5

Table 4: comparison between 6mwd before and after 3 months of oral iron therapy

Parameters	Beforeoral iron therapy	After oral iron therapy	P value
	Mean± SD (n= 41)	Mean± SD (at 3 months) (n= 41)	
6MWD (m)	101.20±11.52	117.95±17.02	<0.001

Table 5: comparison between peak o_2 uptake before and after 3 months of oral iron therapy

Parameters	Beforeoral iron therapy	After oral iron therapy	P value
	Mean± SD (n= 41)	Mean± SD (at 3 months) (n= 41)	
Peak O_2 uptake	996.90±56.88	1062.74±64.19	<0.001

Table 6: NYHA Class before and after 3 months of oral iron therapy

NYHA class	Before treatment (n=41)		After oral iron therapy (n=41)		P value
	No.	%	No.	%	
1	0	0.0	6	14.6	
2	4	9.8	13	31.7	
3	13	31.7	19	46.3	
4	24	58.5	3	7.3	

Table 7: left ventricular dysfunction before and after 3 months of oral iron therapy

LV dysfunction Grade	Beforeoral iron therapy		After oral iron therapy		P value
	No.	%	No.	%	
2	0	0.0	41	100.0	
3	41	100.0	0	0.0	<0.01

Discussion

Chronic Heart Failure (CHF) is one of the most common chronic diseases of present era. It is associated with high morbidity and mortality. Heart failure is on rising trend due to increased prevalence of ischemic heart disease, diabetes mellitus, hypertension, obesity and sedentary life style. Heart failure imposes increased burden on health care facility and is associated with poor quality of life. **About half** of people who develop heart failure **die within 5 years** of diagnosis.[5] Heart failure patients have many co morbidities which results in frequent decompensation of heart failure and warrants hospitalizations.

Iron deficiency Anemia is common co morbidity in heart failure patients with prevalence rate around 30%.[6] The WHO definition of anemia (hemoglobin concentration <13.0 g/dl in men and <12.0 g/dl in women) takes into account known gender differences. STAMINA–HFP (Study of Anemia in a Heart Failure Population) showed a prevalence of anemia in 34% outpatients in study of 1076 chronic heart failure patients.[7] Reduced hemoglobin in patients with CHF has been shown to be independently associated with increased risk of hospitalization and all cause mortality.[43] These findings generally suggest a linear association between reduced hemoglobin and increased mortality risk. The potential mechanisms linking anemia to increased mortality risk in CHF have not been characterized but may be related to changes in ventricular loading conditions, cardiac structure and altered neurohormonal activation. Currently, treatment of anemia in heart failure lacks clear targets and specific therapy is not defined.

Study conducted by Nanas JN et al[8] showed that 73% of HF patients had iron deficiency anemia, 19% had anemia of chronic disease and 5.4% patients had anemia due to hemodilution. Iron deficiency was the most common cause of anemia in HF patients. The iron status of patients with chronic heart failure should be thoroughly evaluated and corrected before considering other therapeutic interventions.

Recent trials COMET (Carvedilol or Metoprolol European Trial) and Val–HeFT (Valsartan in Heart Failure Trial) observed higher one–year incidence rates of new onset anemia in CHF patients 14.2% and 16.9% respectively.[9-10] Studies have proved that an increasing severity of anemia is associated with increasing mortality in patients with CHF.[11]

A vicious circle is present between CHF, chronic kidney insufficiency (CKI) and anemia, each capable of being caused by the other, known as cardio renal syndrome. Anemia in heart failure is considered to develop due to a complex interaction of iron deficiency, kidney disease, and cytokine production. Cytokine activation and inflammation associated is another cause of anemia due to poor iron utilization. Hepcidin is responsible for blocking the iron utilization resulting in iron unavailability. Defective erythropoietin production was present in more than 90% of patients with heart failure which augments and complicates the anemia.[12] Heart failure complicated with iron deficiency anemia is associated with impaired functional capacity, poor quality of life, and increased mortality.[13] Iron deficiency in patients with or without anemia attenuates aerobic performance and is accompanied by fatigue and exercise intolerance.[14] The repletion of iron in patients who have iron deficiency improves cognitive, symptomatic, and exercise performance.

Conclusion

Patient with chronic heart failure has high morbidity and mortality despite multimodal therapy. Iron deficiency anemia is common associated co morbidity in HF patients. Oral Iron therapy is associated with improvement in NYHA

functional class, patient's global assessment and 6MWT distance.

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