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"THE STUDY OF CARDIAC FUNCTION IN PATIENTS WITH SEVERE IRON DEFICIENCY ANEMIA."

General Medicine

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ABSTRACT

Iron deficiency is the commonest nutritional deficiency worldwide; it is the most common type of microcytic anemia. Iron deficiency adversely affects the body's biological functions and limits humans' survival at every complexity level. In the last decade, anemia was recognized as an important comorbid factor in heart failure, a factor limiting physical activity, responsible for the poor quality of life, and a predictor of unfavourable outcomes. Hence, I would like to emphasize parameters based on clinical and echocardiographic findings in iron deficiency anemia for early detection of heart failure. **Aim**: 1]To study the clinical and hematological profile in patients with severe iron deficiency anemia. 2]To evaluate in detail the ECG and chocardiographic abnormalities and left ventricular function in patients with severe iron deficiency anemia. **Materials And Method:** A six-month hospital-based cross-sectional study in all patients diagnosed with severe iron deficiency anemia in the Department of General Medicine, Santhiram Medical College, Nandyal will be taken as subjects who satisfy the inclusion criteria. A total of 50 iron deficiency patients who were admitted to the hospital during this period were taken into the study. **Results:** A total of 50 patients with iron deficiency anemia were enrolled females 33 with a mean age of 37.34 ± 11.46 and males 17 with a mean age of 37.9 ± 13.2. Out of all cases which turned out to be positive for electrocardiography showing ST-segment changes, the majority 80.2% had ST-segment depression. In t-wave morphology changes, 94.1% showed inversion. Among 15 cases of severe anemia, 14 had echocardiography findings suggestive of enlarged cardiac chambers whereas only 8 cases out of 32 in the moderate anemia category showed similar findings. **Conclusion:** Our study found that most patients with Iron deficiency anemia have electrocardiographic and echocardiographic changes. Cardiovascular complications of anemia can be easily diagnosed with these investigations which ultimately help in making a necessary plan for appropriate treatment.

KEYWORDS

INTRODUCTION

Iron deficiency is a nutritional deficiency worldwide, affecting more than one-third of the population. Iron deficiency is more prevalent, and its economic consequences are relevant. Although not commonly acknowledged, iron deficiency adversely affects function and limits the survival of humans at every complexity level.

In the last decade, anemia was recognized as an important comorbidity in heart failure, a factor limiting physical activity, responsible for the poor quality of life, and a predictor of unfavourable outcomes. Iron deficiency was hypothesized to be the cause of erythropoietin resistance in heart failure which could be responsible for the unsatisfactory effects of erythropoietin therapy in heart failure. Most of the available literature has studied the effects of chronic anemia of any etiology on cardiac function and has used M mode parameters for the same.

There are numerous studies on heart failure in iron deficiency anemia but there is a lack of sufficient data regarding left ventricular mass cavity dilation/EF, wall thickness, and volume in iron deficiency anemia. Hence, I would like to emphasize these parameters based on clinical, ECG, and Echocardiographic findings in iron deficiency anemia for early detection of heart failure.

AIM

1]To study the clinical and hematological profile in patients with severe iron deficiency anemia.
2]To evaluate in detail the ECG and Echocardiographic abnormalities and left ventricular function in patients with severe iron deficiency anemia.

MATERIALS AND METHOD

Type of Study: Hospital-based cross-sectional study.

Source Of Data: All selected patients diagnosed with severe iron deficiency anemia in the Department of General Medicine, Santhiram Medical College, Nandyal.

Duration Of Study: From May 2021 to October 2021.

Sample Size: 50 cases.

Methods Of Data Collection:

- Information will be collected through a pre-structured proforma for each study subject.
- The study will be carried out on patients with iron deficiency anemia.
- Qualifying study subjects will be undergoing detailed history, clinical examination, and laboratory investigations.

Sampling Technique: Simple Random Sampling

Sampling Criteria:

Inclusion Criteria

1} Age > 18 years.
2} Patient who will give informed and written consent.
3} Haemoglobin < 6gm% (according to WHO criteria).
4} Microcytic, Hypochromic blood picture in peripheral smear
5} Red cell indices suggestive of iron deficiency anemia.
Patients with congestive cardiac failure due to anemia will be included in the study two weeks after the failure was controlled (for baseline hemodynamics to be stabilized).

Exclusion Criteria

1-Patient who will not give informed and written consent.
2-Chronic renal failure
3-Chronic liver disease
4-Anemia in pregnancy
5-Dimorphic anemia
6-Other cardiac diseases (Ischemic heart disease, Rheumatic heart disease and Infections related).

Data Analysis:

Data was collected using a pretested proforma meeting the study's objectives. Detailed history, physical examination, and necessary investigations were undertaken.

The chi-square and Fisher's Exact test were used in statistical analysis to compare proportions. At a P-value of 0.05, statistical results were considered significant. <0.01.

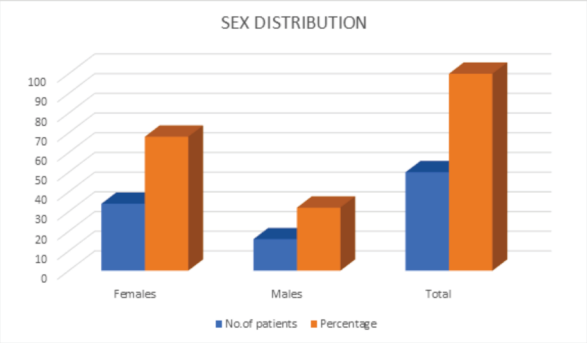
RESULTS:

50 cases were studied, and the following observations were made,

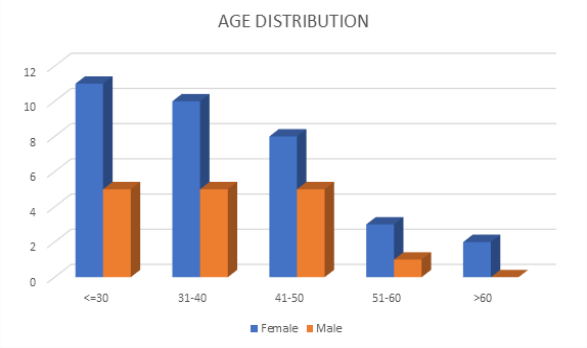
SEX DISTRIBUTION

Out of the 50 cases studied, 34 patients were female, and 16 were male.

The majority were females constituting 68%, and males constituting 32% with p<0.0001, statistically significant.

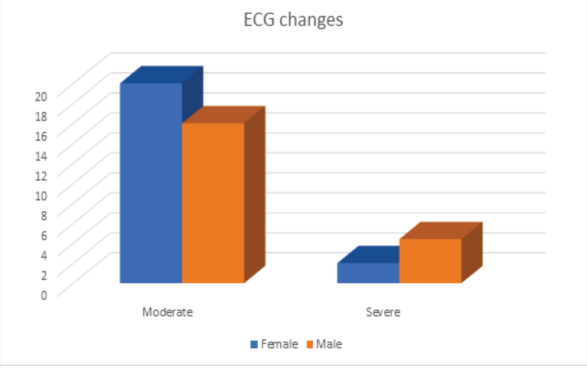


AGE DISTRIBUTION



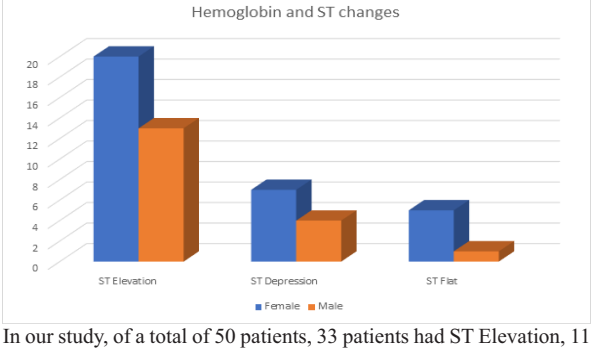
In our study, a total of 50 patients with iron deficiency anemia were enrolled of which females were 34 with a mean age of 37.34 ± 11.46 and males 16 with a mean age of 37.9 ± 13.2.

ANEMIA AND ECG CHANGES



In our study, of a total of 50 patients, 36 patients had moderate changes in ECG out of which 20 were female and 16 males; 14 patients had severe changes in ECG out of which 12 were female and 2 were males.

HEMOGLOBIN AND ST CHANGES:



In our study, of a total of 50 patients, 33 patients had ST Elevation, 11 patients had ST Depression, and 6 patients had a Flat ST wave.

DISCUSSION:

In the present study,50 cases were selected based on a simple random sampling method from the OPD and medical wards of Santhiram medical college and General Hospital, Nandyal.

Iron deficiency is the most common nutritional deficiency in developed and developing regions of the world. Approximately 10% of adult men and 50% of adult women in India have iron deficiency, and it is the most common cause of anemia in our country. Females are more predominantly affected by iron deficiency anemia (IDA). There are several causes of IDA but factors contributing to IDA in females predominantly are blood loss due to menstruation, poor intake, malabsorption, and pregnancy-related factors.

Nikitha Hegde et al in their study stated that the pathogenesis of the cardiomyopathy associated with anemia has not been ascertained. It is unclear whether the anemia itself contributes to the development of heart failure. Theoretically, severe anemia leads to inadequate oxygen delivery to tissues, which in the heart could cause myocyte dysfunction. The total prevalence of electrocardiographic changes in 50 patients was 75%, which was similar to the high incidence of electrocardiographic changes of 62% in 75 patients reported by Mohit Khatri et al.

Among the moderate anemia group, we had 45.2% had ST segment depression and 4.21% had ST elevation, and 8.42% had flat ST segment. There were 32.6% who had T wave inversion and only 1 patient with tall T wave and 2 who had flat T wave. Among the severe anemia group, we had 57.7% who have ST depression and 1 had ST elevation, and 8.8% had flat ST segment. There were 37.7% who had T wave inversion. The study by Neha H. Pandya colleagues also had similar findings of ECG abnormality as the current study.

The LV mass is significantly increased in patients with severe anemia (P<0.001). The mean LV mass was 253.76 gm ± 10.13 in cases of severe anemia and 181.20 gm ± 34.63 in cases of moderate anemia which is suggestive of hypertrophy. Trivedi et al studied left ventricular mass in the normal Indian population and found that the left ventricular mass in men was found to be 124 ± 32gm in males whereas in women it was 93 ± 37 gm. The increased LV mass reflects a hypertrophic response to a chronic volume overload state.

In our study, multiple linear regression analysis between hemoglobin levels and various ECHO parameters studied showed that with every 1gm% fall in hemoglobin the LV mass increased by 13.94, and the chances of this occurring was 54.49% which is statistically significant.

CONCLUSION

1] Iron deficiency anemia is the most common preventable nutritional deficiency in developing counties like India. Cardiovascular complications of IDA can be easily diagnosed with ECG and ECHO.
2] In our study we found the majority of the patients with IDA are having ECG and ECHO changes. Severe IDA leads to an increase in Left Ventricular mass, left ventricular internal dimensionsystole, left ventricular internal dimension-diastole, right ventricular internal dimension-systole, and right ventricular internal dimension-diastole all suggestive of a volume overload state. In cases of mild-to-moderate anemia, hemodynamic adaptations permit adequate cardiovascular compensation. The combination of increased heart rate and stroke volume increases cardiac output, which, in turn, improves oxygen delivery whereas in severe IDA with HB < 6.9 gm/dl. diastolic and systolic LV chamber sizes increase to accommodate this greater output.
3] In multiple logistic regression analysis, each 1g/ dl decrease in hemoglobin was associated with an 8% increase in the risk of LV hypertrophy.
4] Our study gives an idea of various ECG and ECHO changes in IDA patients. This study also helps in making a necessary plan to diagnose cardiovascular complications of IDA with the help of ECG and ECHO and which helps in treatment planning.

LIST OF ABBREVIATIONS:

ECG- Electrocardiogram
ECHO-2d echocardiography
IDA- Iron Deficiency Anaemia
MCV- Mean Corpuscular Volume
MCHC – Mean Corpuscular Haemoglobin Concentration
LVH - Left Ventricular Hypertrophy
CHF – Congestive Heart Failure